



Fisheries New Zealand

Tini a Tangaroa

Fish and invertebrate bycatch in New Zealand deepwater fisheries from 1990–91 until 2016–17

New Zealand Aquatic Environment and Biodiversity Report No. 210

B. Finucci
C.T.T Edwards
O.F. Anderson
S.L. Ballara

ISSN 1179-6480 (print)
ISBN 978-1-98-859453-8 (online)

April 2019



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EXECUTIVE SUMMARY

Finucci, B.; Edwards, C.T.T; Anderson, O.F.; Ballara, S.L. (2019). Fish and invertebrate bycatch in New Zealand deepwater fisheries from 1990–91 until 2016–17.

New Zealand Aquatic Environment and Biodiversity Report No. 210. 77 p.

Commercial catch-effort data and fisheries observer records of catch by species provided by Fisheries New Zealand (FishNZ) were used to estimate the weight of individual fish and invertebrate species bycatch in each fishing year from 1990–91 to 2016–17 for the following Tier-1 target deepwater fisheries: the arrow squid (SQU), hoki, hake, ling (HOK/HAK/LIN), southern blue whiting (SBW), orange roughy (ORH), oreo (OEO), and scampi (SCI) trawl fisheries; and the ling (LIN) longline fishery. This report provides an update and complete revision of the previous iteration, incorporating a statistical model method to estimate total annual bycatch from the observed portion of each fishery.

Summary tables were made for each fishery, and for all fisheries combined, to provide an easy reference for examining temporal changes in the bycatch of each species or species group caught. This report should be used as a coarse filter to identify trends in bycatch weight that may be of concern for particular species for further investigation. Improvements in species identification, introduction of new codes, changes in observer recording practices or fishing effort can all have an effect on the apparent increase or decrease in the bycatch of some taxa, where there are known issues of this type these are highlighted to aid trend interpretation, but detailed analysis of individual trends is not the purpose of this report so trends should be interpreted cautiously.

All fisheries examined showed measurable declines or increases in bycatch of certain species over time, and declines or increases (statistically significant or otherwise) were seen for a few species across six or more of the eight fisheries. Those increasing included pale ghost shark (*Hydrolagus bemisi*) (significant in four fisheries), rough skate (*Zearaja nasuta*) (significant in three fisheries), leafscale gulper shark (*Centrophorus squamosus*) (significant in three fisheries), Baxter's dogfish (*Etmopterus granulosus*) (significant in two fisheries), and silverside (*Argentina elongata*) (significant in two fisheries). Those declining were: skates (Rajidae and Arhynchobatidae) (significant in seven fisheries), dark ghost shark (*Hydrolagus novaezealandiae*) (significant in five fisheries), unidentified sharks (significant in five fisheries), and unidentified rattails (significant in four fisheries). Some of these trends are likely to be driven by improved species identification and the reduction in the use of generic codes in observer reporting over time, for example the increase of rough skates and the decrease of combined skates.

Overall, bycatch weights were highly variable across fisheries. The hoki, hake, and ling trawl fishery had the highest bycatch weights in most years, while fisheries with low annual bycatch weights included the oreo and southern blue whiting trawl fisheries. Weights of bycatch are a product of both the effort in the fishery and the rate of capture, so even though some fisheries, e.g. scampi, may have a high bycatch rate the weight of bycatch is relatively low due to relatively low effort in this fishery. Considering those fisheries where total bycatch estimates have been produced using both the ratio-based method and the two-part, binomial/log-normal statistical method: estimates for the scampi trawl fishery were similar across the two methods; estimates for the arrow squid trawl fishery were mostly lower with the statistical method; and estimates for the hoki, hake, and ling trawl fishery were consistently higher using the statistical method over the ratio-based method. Based on this analysis and results from related projects, the statistical model has been proven to provide robust and accurate results even when data are limited and will continue to be used in future analysis.

1. INTRODUCTION

Bycatch and discarding of unintentional, low value, and unmarketable catch occurs in most commercial fisheries worldwide. On a global scale, annual bycatch has been estimated at 38.5 million tonnes, equivalent to approximately 40% of the total global marine catches (Davies et al., 2009). Without monitoring and appropriate management measures, bycatch can negatively impact non-target species (Alverson et al., 1994). An understanding of the impacts of fishing on bycatch species is therefore required to ensure sustainable fisheries management.

Bycatch and discard estimates in New Zealand commercial deepwater fisheries were first reported in 2000, using commercial catch records and observer bycatch data dating back to the 1990–91 fishing season (Anderson et al., 2000). In recent years, the number of individual species or groups reported in New Zealand fisheries has increased substantially, largely due to the introduction of detailed identification guides and an increase in the level of species identification, particularly for invertebrates (O'Driscoll et al., 2011). For morphologically similar species where identification can be difficult (e.g., deepwater sharks), observer identification has been shown to be reliable (McMillan et al., 2018).

Estimation of non-protected species bycatch and discards is carried out for each of New Zealand's Tier-1 Deepwater fisheries (high volume, high value, quota management system stocks) on a rotational basis, with each of the following fisheries updated about every four to five years: arrow squid (SQU), hoki, hake, and ling (HOK/HAK/LIN), southern blue whiting (SBW), orange roughy (ORH), oreo (OEO), and scampi (SCI) trawl fisheries; and the ling (LIN) longline fishery. An annual discard to target species catch ratio is estimated to indicate how effective targeted fisheries are, with relative rates of discards to target catch (in kilograms) varying from 0.01 (jack mackerel, southern blue whiting, oreo) to 3.83 (scampi) (Ministry for Primary Industries, 2017).

While these in-depth analyses only examine the key target fisheries species, an additional annual overview of all deepwater tier 1 fisheries is produced, compiling a list of all fish and invertebrate species reported as bycatch. The objective of these annual overviews is to provide estimates of annual catch weights, which could be relatively rapidly produced and regularly updated and allow for early detection of any downward (or upward) trends in bycatch of individual species across all fisheries for further investigation if necessary.

This report provides an update and complete revision of the previous iteration by Anderson (2017), which provided estimates of annual bycatch from 1990–91 to 2015–16 for a wide range of bycatch species in each Tier-1 Deepwater fishery. Unlike previous analyses in the series, the ratio estimator-based method used for estimating bycatch has been replaced with a two-part, binomial/log-normal statistical method, described in further detail in the Methods section.

This report was prepared as an output from the Ministry for Primary Industries project DAE2017–04 “Quantification of key bycatch groups across fisheries” which has the following objectives.

Overall objective:

To summarise total catch, including quantification of non-target species, for all deepwater fisheries.

Specific objectives:

1. To compare estimated rates, amounts, and trends of bycatch over time in deepwater fisheries.
2. To update any relevant sections of the Aquatic Environment and Biodiversity Annual Review (AEBAR) (Section 9.3.2 – 9.3.11 and 9.4) and Environmental and Ecosystem considerations sections of the Fisheries Assessment Plenary (FAP) documents with new results from this work.

Specific Objective 2 will be reported as part of the AEBAR and FAP.

2. METHODS

Observer bycatch data were extracted from the MPI *cod* database for each of the Tier-1 species target fisheries (hoki/hake/ling trawl, jack mackerel trawl, orange roughy trawl, oreo trawl, southern blue whiting trawl, scampi trawl, arrow squid trawl, and ling longline) for the period 1990–91 to 2016–17. Commercial catch records were also obtained from the Ministry for Primary Industries for each fishery, then used to calculate annual effort (number of tows or longline sets) for each fishery. Anderson & Edwards (2018) provide a more detailed description of the general methodology used to extract and groom observer and commercial fishing return data and calculate bycatch and annual weights.

Previous iterations of this work (e.g., Ballara, 2015; Anderson, 2017) used a ratio estimator-based method to estimate bycatch, in which the ratio of annual non-target species catch to estimated annual target species catch was calculated and multiplied by the total annual estimated landed catch of the target species. Here, revised estimates of bycatch for each fishery, bycatch species, and fishing year with estimated precision were provided using the two-part, binomial/log-normal statistical method outlined in Anderson et al. (*in prep*). This modelling approach included a standard set of covariates (fishing year and standard fishery area, Figure 1) that were used for both model parts, with independent coefficients. This same model structure was applied across all species.

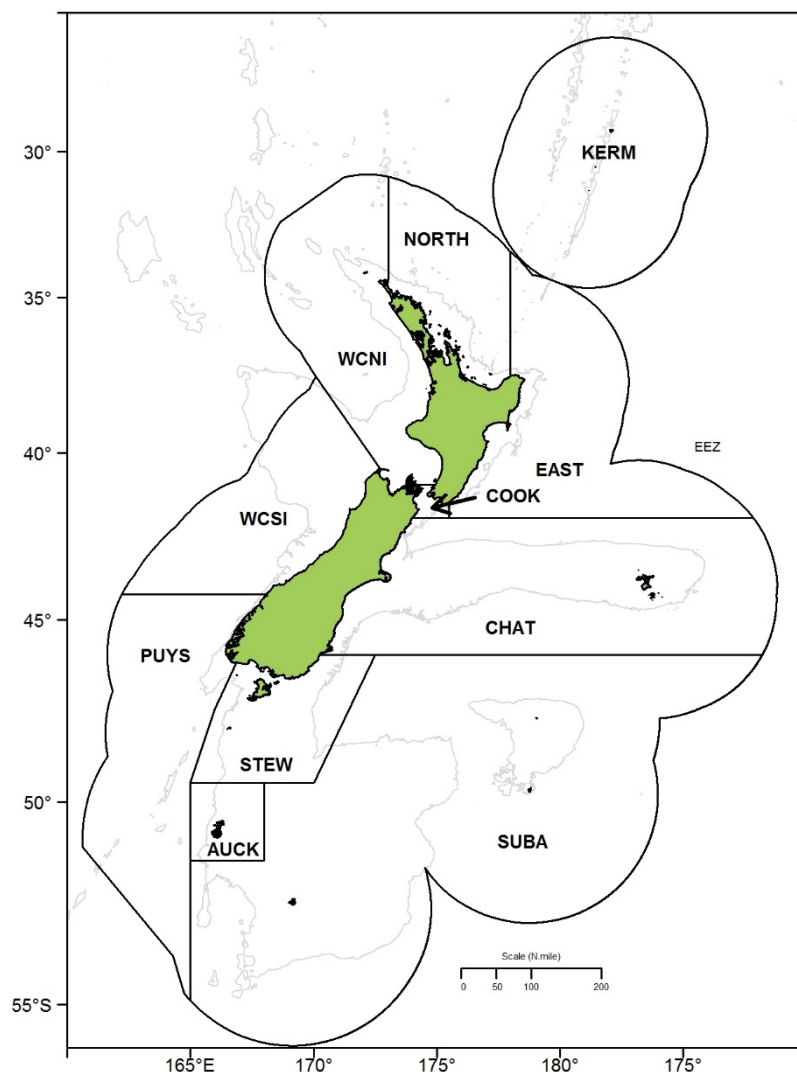


Figure 1: Standardised fishery areas used as classes for the fishery area covariate in the estimation of bycatch: KERM, Kermadecs; NORTH, Northern North Island; WCNI, West Coast North Island; EAST, East Coast North Island; COOK, Cook Strait; WCSI, West Coast South Island; CHAT, Chatham Rise; PUY, Puysegur; STEW, Stewart-Snares Shelf; AUCK, Auckland Islands; SUBA, sub-Antarctic. The grey lines indicate the 1000 m isobath.

The model was coded in the R-package *rstan* and fitted using the *optimizing* function (Stan Development Team, 2016). This estimates an approximation of the posterior density as a multivariate normal distribution on the log-scale. To obtain estimates for quantities of interest (in this case the bycatch), 2000 samples were drawn from the assumed log-posterior and then back transformed onto the natural scale. This provided a distribution from which we could obtain the median and 95% quantiles. Simulation based comparisons (see the *bde* package vignettes) showed this approach to give estimates and credibility intervals similar to those for a full posterior generated using MCMC for a simple model structure (Figure 2).

Estimates of total annual catch were rounded to the nearest tonne. A loglinear regression was fitted to the data and the slope coefficient was calculated to give an indication of whether the bycatch of each species increased (positive slope), decreased (negative slope), or stayed relatively unchanged (slope equal to zero) over time. Trends (positive or negative) were considered significant when $p < 0.05$.

Tables were constructed for each fishery showing the annual estimated bycatch for each species and the regression slope coefficient. A colour-coded summary table is also provided, to highlight the species in each fishery with significantly declining or increasing catch weights.

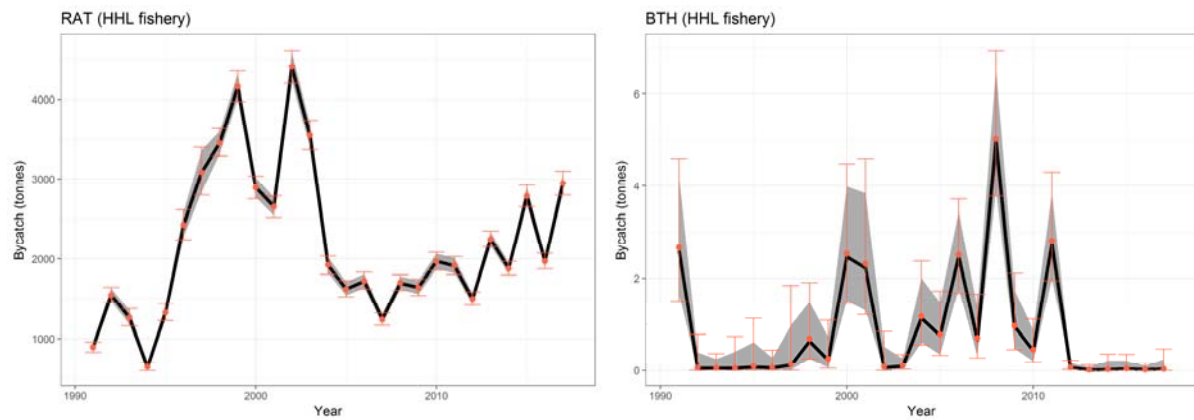


Figure 2: Examples of simulation-based comparisons between MCMC (black trend line with grey 95% confidence interval) and MPD (orange points with 95% confidence interval) model estimations for a high bycatch species (rattails, Macrouridae, RAT) and a low bycatch species (bluntnose deep-sea skates, *Notoraja* spp., BTH) in the hoki, hake, and ling (HHL) fishery.

3. RESULTS

Annual bycatch estimates for individual species in each of the eight Tier-1 fisheries are given in Tables 1 to 8. The following is a brief summary of those tables, with figures showing the annual bycatch of species having the greatest increase or decrease over time.

Arrow squid trawl fishery

- Of the 347 bycatch species examined, 68 showed a decrease in catch over time and 15 were significant; 81 showed an increase and 29 were significant
- Species showing the greatest decline were paddle crab (*Ovalipes catharus*, PAD), jack mackerels (*Trachurus* spp., JMA), and thresher shark (*Alopias vulpinus*, THR) (Figure 3)
- Species showing the greatest increase were giant spider crab (*Jacquiniotia edwardsii*, GSC), smooth red swimming crab (*Nectocarcinus bennetti*, NCB), and beaked sandfish (*Gonorynchus forsteri* & *G. greyi*, GON) (Figure 3).
- The most common bycatch species by weight (t) were barracouta (*Thyrsites atun*, BAR), silver warehou (*Seriolella punctata*, SWA), and spiny dogfish (*Squalus acanthias*, SPD) (Figure 4).

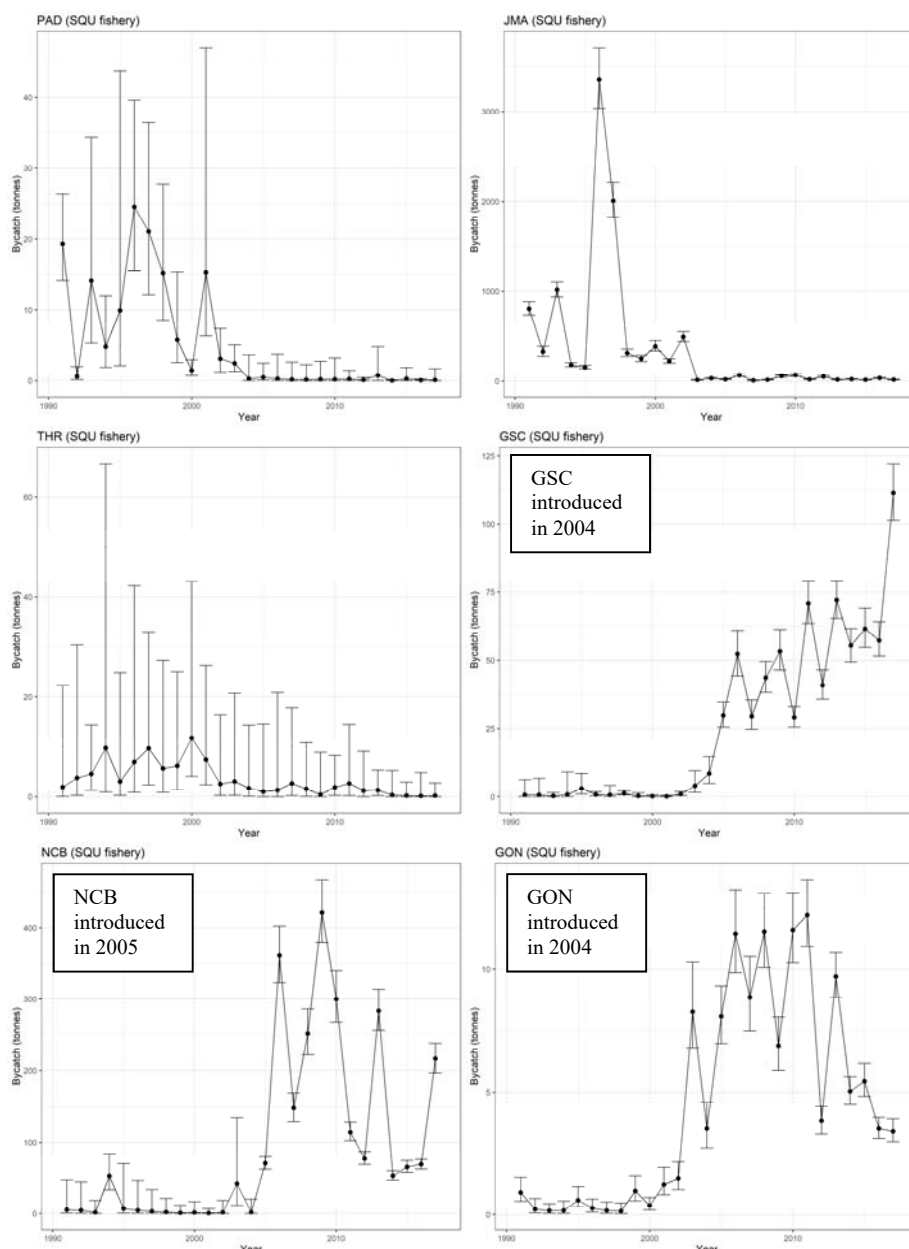


Figure 3: Annual bycatch estimates in the arrow squid trawl fishery for the species showing the greatest increases and declines between 1990–91 and 2016–17. See text above for explanation of the species codes. The codes GSC, NCB, and GON were introduced in 2004, 2005, and 2004, respectively, so no catches were reported under these codes prior to the introduction dates. Note: the scale changes on the y-axis between plots.

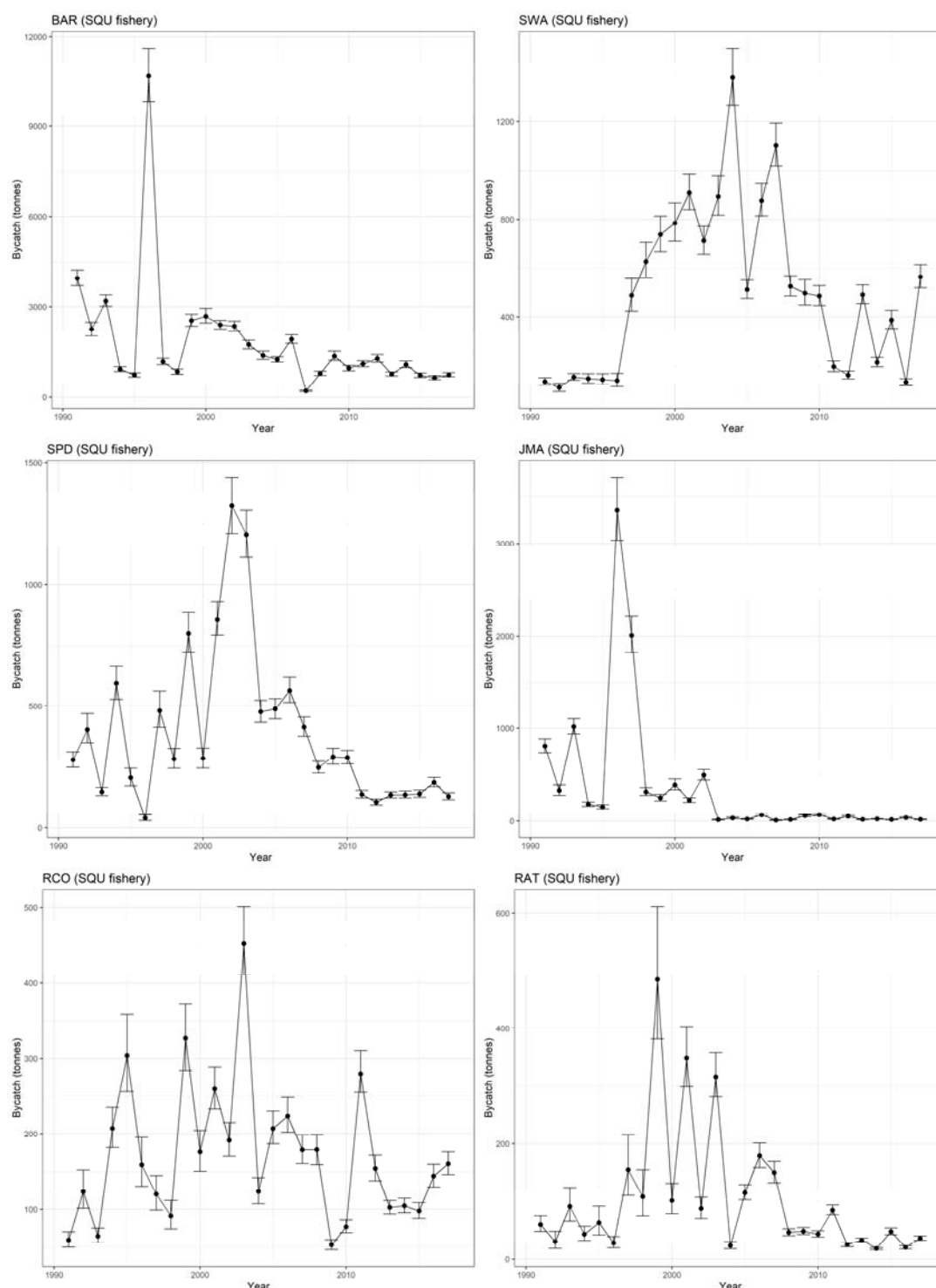


Figure 4: Annual bycatch estimates for the most common arrow squid trawl fishery bycatch species by weight between 1990–91 and 2016–17. See <http://marlin.niwa.co.nz> or Table 10 for species code definitions. Note: the scale changes on the y-axis between plots. BAR and JMA had significant decreasing trends, SPD and RAT had non-significant decreasing trends, SWA had an increasing non-significant trend, and RCO showed no trend.

Table 1: Arrow squid trawl fishery. Total annual bycatch estimates (t) (with estimated 95% CIs) and slope of the regression for the top 50 individual species in this fishery (see <http://marlin.niwa.co.nz> for species code definitions). Species are ordered by decreasing total catch.

	BAR	SWA	SPD	JMA	RCO	RAT	NCB	HOK	WAR	LIN
1990–91	3953 (3707–4229)	135 (120–151)	278 (247–311)	805 (735–885)	59 (50–70)	60 (48–76)	5 (0–47)	67 (53–95)	142 (115–176)	24 (19–31)
1991–92	2243 (2027–2481)	110 (94–128)	402 (348–469)	327 (274–388)	124 (101–152)	30 (19–48)	5 (0–44)	33 (22–57)	213 (168–269)	29 (22–38)
1992–93	3192 (3011–3392)	153 (141–167)	147 (131–165)	1017 (937–1103)	64 (55–75)	92 (66–125)	2 (0–18)	94 (78–114)	321 (279–369)	44 (37–53)
1993–94	927 (852–1012)	147 (129–167)	595 (528–664)	182 (159–206)	207 (182–235)	43 (32–57)	53 (33–84)	107 (90–129)	19 (12–30)	66 (55–78)
1994–95	734 (668–809)	143 (122–167)	205 (171–244)	153 (134–175)	304 (256–358)	64 (42–92)	7 (1–70)	70 (54–89)	2 (1–4)	53 (41–67)
1995–96	10681 (9827–11610)	139 (115–168)	41 (30–54)	3357 (3036–3711)	159 (131–195)	28 (20–39)	5 (0–46)	97 (75–126)	40 (24–68)	8 (5–13)
1996–97	1181 (1078–1290)	488 (423–557)	481 (412–563)	2009 (1823–2212)	120 (99–145)	156 (111–216)	3 (0–34)	135 (112–165)	50 (30–79)	40 (32–51)
1997–98	845 (762–935)	627 (560–706)	281 (244–325)	313 (273–357)	91 (74–112)	109 (75–155)	2 (0–21)	90 (71–115)	10 (4–22)	34 (27–42)
1998–99	2542 (2346–2748)	737 (668–813)	799 (724–885)	250 (217–287)	326 (284–372)	485 (381–611)	1 (0–12)	158 (125–207)	25 (17–36)	107 (90–128)
1999–00	2680 (2455–2941)	783 (710–867)	284 (244–326)	387 (334–452)	176 (150–204)	102 (79–132)	2 (0–17)	39 (26–67)	111 (87–141)	15 (11–21)
2000–01	2395 (2254–2546)	909 (840–985)	856 (793–928)	224 (200–250)	260 (233–289)	349 (299–403)	<1 (0–7)	40 (27–71)	71 (58–89)	46 (40–55)
2001–02	2352 (2180–2520)	712 (657–771)	1322 (1210–1439)	492 (438–551)	191 (170–215)	88 (71–108)	2 (0–19)	141 (104–231)	30 (22–42)	81 (70–96)
2002–03	1736 (1596–1883)	894 (817–979)	1205 (1112–1304)	13 (10–17)	452 (410–501)	317 (282–358)	42 (11–135)	106 (77–199)	10 (6–17)	227 (195–265)
2003–04	1380 (1255–1520)	1383 (1269–1504)	476 (433–524)	32 (25–41)	124 (107–142)	23 (18–30)	2 (0–20)	21 (15–33)	102 (82–126)	55 (43–68)
2004–05	1250 (1167–1338)	512 (475–552)	488 (447–531)	20 (17–24)	207 (187–230)	116 (104–130)	71 (62–80)	45 (35–74)	32 (24–43)	85 (73–100)
2005–06	1915 (1776–2064)	876 (814–948)	564 (515–620)	65 (53–79)	224 (202–249)	179 (159–201)	361 (323–402)	106 (87–133)	119 (90–155)	154 (137–175)
2006–07	209 (188–231)	1104 (1021–1194)	413 (374–455)	8 (5–11)	179 (161–198)	151 (133–170)	148 (129–169)	134 (109–195)	164 (135–199)	143 (124–164)
2007–08	787 (723–862)	526 (485–569)	246 (223–272)	15 (11–19)	179 (159–199)	47 (41–53)	252 (222–286)	52 (42–64)	7 (4–11)	34 (29–40)
2008–09	1357 (1221–1520)	497 (448–553)	290 (260–325)	57 (46–70)	53 (46–59)	49 (43–55)	421 (380–467)	70 (56–89)	44 (32–60)	45 (38–53)
2009–10	965 (876–1058)	485 (446–528)	288 (262–318)	68 (56–82)	77 (69–86)	44 (39–49)	300 (267–340)	76 (64–94)	35 (27–45)	42 (36–48)
2010–11	1106 (1006–1213)	196 (176–219)	137 (122–153)	20 (17–25)	280 (255–310)	85 (78–94)	114 (103–128)	135 (117–155)	36 (27–47)	117 (105–132)
2011–12	1281 (1160–1411)	161 (146–178)	105 (94–118)	51 (42–61)	154 (138–172)	25 (22–28)	77 (69–87)	60 (49–71)	20 (15–26)	32 (27–38)
2012–13	768 (706–839)	490 (454–531)	134 (123–147)	16 (13–19)	103 (94–112)	33 (30–37)	283 (256–314)	49 (42–57)	33 (28–40)	39 (34–45)
2013–14	1082 (981–1199)	214 (196–234)	135 (122–150)	21 (17–25)	105 (96–115)	18 (17–20)	53 (47–60)	66 (57–76)	35 (28–43)	43 (37–49)
2014–15	727 (658–802)	386 (351–426)	139 (126–154)	14 (12–17)	98 (88–109)	48 (43–55)	65 (58–75)	95 (75–184)	73 (61–87)	63 (55–72)
2015–16	647 (582–718)	132 (119–147)	185 (168–206)	36 (30–42)	144 (130–160)	20 (18–23)	69 (62–76)	32 (27–38)	2 (1–4)	30 (26–35)
2016–17	740 (675–816)	565 (520–615)	129 (116–144)	16 (14–19)	161 (146–176)	36 (33–40)	216 (197–238)	56 (47–81)	32 (24–41)	73 (65–82)
slope	–0.05	0.02	–0.03	–0.17	0	–0.04	0.19	–0.01	–0.04	0.02

	GIZ	HAP	GSH	BSK	RBM	RSO	RSK	SCH	SSK	STU
1990–91	28 (23–33)	36 (29–44)	9 (5–15)	23 (0–456)	131 (112–152)	148 (132–165)	2 (1–5)	6 (3–10)	15 (10–22)	21 (16–27)
1991–92	49 (39–61)	9 (6–14)	10 (4–20)	23 (0–518)	14 (8–23)	65 (51–82)	10 (5–20)	7 (3–15)	7 (3–15)	49 (39–63)
1992–93	39 (32–48)	21 (16–26)	17 (11–25)	12 (0–283)	186 (162–211)	63 (55–71)	25 (19–33)	8 (5–11)	19 (13–26)	49 (42–59)
1993–94	41 (33–49)	34 (27–42)	19 (14–26)	54 (3–502)	13 (9–17)	49 (40–60)	1 (0–2)	4 (2–8)	25 (19–32)	63 (52–76)
1994–95	57 (46–70)	111 (94–128)	27 (17–43)	39 (0–695)	39 (30–49)	52 (43–65)	23 (15–34)	10 (5–17)	20 (14–29)	29 (21–39)
1995–96	8 (5–14)	56 (44–71)	5 (2–13)	33 (0–668)	145 (119–176)	22 (15–31)	3 (0–27)	12 (6–21)	3 (1–6)	159 (136–186)
1996–97	38 (29–51)	20 (15–28)	34 (21–56)	27 (0–456)	151 (122–186)	27 (19–38)	2 (1–10)	14 (7–25)	25 (18–35)	34 (27–42)
1997–98	17 (13–22)	42 (34–52)	30 (15–57)	17 (0–399)	15 (10–24)	12 (8–18)	1 (0–13)	10 (6–17)	6 (3–10)	8 (6–11)
1998–99	59 (49–70)	46 (39–55)	156 (114–209)	53 (3–516)	19 (14–25)	16 (12–22)	8 (2–34)	34 (25–46)	100 (81–122)	6 (3–10)
1999–00	27 (21–36)	25 (19–32)	20 (14–30)	77 (14–438)	21 (15–29)	6 (3–12)	1 (0–3)	25 (16–39)	31 (20–47)	32 (25–40)
2000–01	68 (58–80)	85 (76–96)	178 (131–241)	118 (15–658)	104 (88–123)	5 (3–7)	1 (0–2)	79 (57–115)	58 (44–83)	46 (36–60)
2001–02	111 (97–128)	60 (52–69)	108 (79–148)	29 (0–323)	17 (12–22)	67 (58–80)	2 (1–6)	70 (54–90)	57 (45–75)	22 (18–28)
2002–03	193 (171–217)	146 (129–167)	306 (250–374)	222 (61–840)	7 (5–11)	233 (208–260)	7 (3–15)	132 (111–159)	192 (154–250)	10 (7–15)
2003–04	33 (28–40)	75 (65–86)	21 (13–34)	18 (1–119)	6 (4–8)	27 (21–33)	78 (44–122)	19 (13–27)	41 (28–63)	4 (2–6)
2004–05	74 (64–84)	118 (105–132)	57 (45–74)	34 (1–348)	40 (33–49)	34 (28–41)	74 (61–91)	54 (44–66)	37 (29–48)	72 (59–87)
2005–06	117 (103–133)	87 (75–101)	65 (51–81)	19 (0–401)	56 (46–67)	22 (17–29)	76 (62–93)	61 (48–76)	40 (31–53)	22 (18–28)
2006–07	102 (88–118)	55 (47–65)	119 (98–144)	94 (17–472)	18 (14–23)	6 (4–9)	131 (102–168)	30 (23–41)	74 (57–101)	8 (6–11)
2007–08	42 (37–49)	35 (30–41)	15 (11–20)	17 (0–234)	17 (14–21)	4 (3–6)	45 (38–54)	18 (14–24)	14 (10–19)	17 (13–21)
2008–09	33 (28–39)	65 (56–75)	8 (6–12)	14 (0–168)	3 (2–5)	2 (1–3)	35 (28–42)	22 (17–29)	6 (4–8)	15 (12–19)
2009–10	70 (63–78)	64 (56–72)	26 (21–33)	7 (0–202)	4 (3–5)	5 (4–8)	52 (45–59)	29 (23–36)	3 (2–5)	11 (8–15)
2010–11	84 (75–93)	37 (32–43)	44 (37–52)	60 (0–510)	12 (9–14)	17 (13–22)	92 (82–104)	47 (39–57)	16 (12–20)	15 (11–19)
2011–12	30 (26–34)	27 (23–31)	11 (9–14)	23 (0–308)	10 (8–13)	3 (2–5)	20 (16–24)	16 (13–21)	6 (4–8)	7 (5–10)
2012–13	37 (34–42)	30 (26–34)	18 (15–21)	81 (0–602)	16 (14–19)	7 (6–10)	48 (43–55)	28 (24–33)	11 (9–14)	6 (4–8)
2013–14	48 (42–54)	33 (29–38)	17 (14–20)	1 (0–78)	3 (2–4)	11 (8–15)	38 (33–44)	30 (26–36)	10 (8–13)	10 (8–12)
2014–15	67 (60–76)	41 (36–48)	20 (17–24)	1 (0–88)	4 (3–5)	6 (5–8)	68 (60–78)	28 (24–34)	14 (11–19)	5 (4–7)
2015–16	62 (55–69)	32 (27–37)	31 (26–36)	3 (0–125)	8 (6–10)	9 (7–11)	41 (36–47)	32 (26–39)	13 (10–16)	20 (16–24)
2016–17	54 (49–61)	29 (24–34)	18 (15–21)	2 (0–105)	2 (2–3)	66 (58–77)	61 (54–69)	36 (31–43)	10 (7–13)	10 (8–13)
slope	0.02	0.01	0	–0.08	–0.11	–0.08	0.14	0.06	–0.02	–0.07

	GSC	CRB	SPE	RBT	NMP	SDO	POS	JAV	WWA	CAR
1990–91	1 (0–6)	11 (7–15)	9 (6–15)	3 (2–4)	2 (1–5)	1 (0–1)	3 (0–16)	3 (1–7)	2 (1–4)	1 (0–5)
1991–92	1 (0–7)	<1 (0–1)	54 (38–73)	14 (10–20)	6 (2–15)	1 (0–7)	12 (3–41)	1 (0–9)	8 (4–15)	1 (0–6)
1992–93	<1 (0–1)	10 (7–15)	13 (10–18)	12 (9–14)	1 (1–4)	1 (0–3)	10 (4–21)	3 (1–7)	3 (2–6)	1 (0–2)
1993–94	1 (0–9)	40 (27–59)	3 (2–4)	2 (1–3)	<1 (0–1)	<1 (0–3)	8 (4–17)	3 (1–11)	4 (2–7)	1 (0–2)
1994–95	3 (1–9)	11 (8–13)	28 (18–44)	1 (1–3)	12 (4–33)	1 (0–2)	4 (1–16)	2 (1–4)	4 (3–8)	2 (1–4)
1995–96	1 (0–2)	13 (10–17)	6 (3–15)	4 (2–6)	5 (0–50)	1 (0–8)	13 (6–29)	2 (0–16)	8 (4–13)	1 (0–3)
1996–97	1 (0–4)	78 (61–98)	41 (25–67)	24 (17–33)	9 (3–28)	3 (1–7)	16 (8–32)	2 (0–10)	5 (2–9)	1 (0–3)
1997–98	1 (1–2)	13 (10–18)	51 (33–75)	91 (70–118)	14 (5–37)	3 (2–6)	28 (15–50)	4 (1–15)	18 (11–30)	1 (0–2)
1998–99	<1 (0–1)	8 (5–14)	55 (40–75)	25 (19–31)	93 (63–138)	<1 (0–1)	40 (25–62)	53 (34–82)	18 (12–26)	2 (1–4)
1999–00	<1 (0–1)	7 (6–9)	8 (5–15)	58 (46–74)	20 (11–38)	2 (0–11)	36 (22–58)	2 (1–6)	15 (9–24)	2 (1–5)
2000–01	<1 (0–1)	23 (18–31)	56 (41–75)	48 (41–55)	9 (6–16)	11 (8–15)	53 (37–80)	21 (12–49)	38 (27–54)	6 (4–10)
2001–02	1 (0–2)	79 (66–95)	22 (16–30)	99 (86–114)	68 (41–112)	55 (44–67)	33 (20–55)	19 (11–41)	15 (10–23)	3 (2–5)
2002–03	4 (2–10)	127 (109–158)	43 (33–56)	36 (31–42)	127 (90–179)	97 (85–109)	30 (17–54)	30 (21–43)	52 (41–65)	41 (32–52)
2003–04	8 (5–15)	124 (103–155)	18 (12–26)	41 (35–48)	22 (15–34)	32 (25–39)	11 (5–23)	4 (2–6)	22 (14–33)	11 (8–16)
2004–05	30 (26–35)	40 (33–47)	15 (11–19)	24 (21–27)	41 (30–56)	26 (22–30)	25 (14–42)	14 (9–21)	10 (7–15)	8 (6–11)
2005–06	52 (44–61)	13 (10–16)	27 (21–34)	12 (9–15)	20 (12–31)	25 (21–30)	22 (12–42)	49 (38–65)	11 (8–17)	19 (14–24)
2006–07	29 (25–35)	8 (6–12)	10 (7–14)	8 (7–11)	32 (21–49)	4 (3–6)	20 (11–36)	77 (58–104)	16 (12–23)	23 (18–30)
2007–08	44 (38–50)	17 (13–22)	10 (8–13)	3 (3–4)	6 (4–10)	14 (12–17)	7 (3–14)	4 (2–6)	1 (1–3)	6 (5–9)
2008–09	53 (46–61)	1 (0–2)	7 (5–9)	4 (3–6)	1 (0–3)	11 (9–13)	4 (1–9)	8 (5–11)	3 (1–5)	11 (8–14)
2009–10	29 (26–33)	2 (1–3)	20 (16–25)	10 (8–12)	2 (1–4)	19 (17–22)	8 (4–16)	4 (3–6)	8 (5–12)	13 (10–15)
2010–11	71 (64–79)	4 (3–6)	30 (25–36)	3 (2–3)	11 (7–16)	29 (25–33)	13 (6–23)	11 (8–15)	13 (10–17)	32 (26–38)
2011–12	41 (36–47)	<1 (0–1)	12 (9–16)	2 (2–3)	3 (1–6)	6 (5–7)	4 (2–11)	3 (2–6)	12 (9–17)	6 (4–7)
2012–13	72 (65–79)	4 (3–6)	5 (4–6)	3 (2–3)	3 (2–5)	16 (14–18)	3 (1–7)	3 (2–4)	8 (6–10)	11 (9–13)
2013–14	55 (49–62)	2 (1–3)	4 (3–5)	2 (2–2)	1 (0–1)	24 (21–27)	4 (2–9)	4 (3–5)	3 (2–4)	14 (12–17)
2014–15	62 (55–69)	2 (2–4)	6 (4–7)	2 (1–2)	2 (2–4)	13 (12–16)	8 (4–13)	10 (8–12)	4 (3–5)	27 (23–31)
2015–16	57 (52–64)	5 (3–7)	8 (6–10)	1 (1–2)	6 (3–8)	16 (14–19)	7 (4–12)	2 (1–3)	7 (6–9)	7 (6–9)
2016–17	111 (101–122)	4 (3–6)	3 (2–4)	4 (3–4)	3 (2–4)	18 (16–21)	4 (2–9)	4 (3–6)	10 (8–13)	15 (13–18)
slope	0.25	–0.07	–0.05	–0.06	–0.01	0.15	–0.03	0.03	0	0.13

	HPB	FRO	MAK	SPI	WIT	BWS	OCT	PAD	HAK	GON
1990–91	28 (22–35)	4 (2–7)	2 (0–23)	<1 (0–2)	6 (5–8)	1 (0–8)	1 (0–2)	19 (14–26)	3 (2–6)	1 (1–2)
1991–92	40 (32–51)	1 (0–2)	2 (0–27)	5 (2–12)	1 (1–2)	3 (1–13)	2 (1–4)	1 (0–2)	2 (1–6)	<1 (0–1)
1992–93	43 (37–49)	2 (1–3)	2 (0–12)	<1 (0–1)	3 (2–5)	1 (0–7)	3 (2–5)	14 (5–34)	4 (2–6)	<1 (0–0)
1993–94	9 (7–13)	3 (2–6)	4 (1–14)	<1 (0–2)	3 (2–4)	1 (0–14)	15 (11–21)	5 (2–12)	4 (2–7)	<1 (0–1)
1994–95	4 (1–9)	5 (2–10)	4 (0–26)	<1 (0–2)	2 (1–4)	2 (0–21)	3 (1–5)	10 (2–44)	3 (1–6)	1 (0–1)
1995–96	6 (3–12)	2 (1–7)	13 (5–34)	<1 (0–1)	1 (1–2)	2 (0–27)	2 (1–5)	25 (15–40)	1 (0–4)	<1 (0–1)
1996–97	6 (4–11)	2 (1–6)	16 (6–42)	<1 (0–1)	1 (0–2)	6 (1–26)	6 (4–9)	21 (12–36)	3 (2–7)	<1 (0–1)
1997–98	1 (0–3)	2 (1–6)	21 (10–43)	6 (4–10)	1 (0–2)	2 (0–13)	1 (0–2)	15 (9–28)	3 (1–7)	<1 (0–0)
1998–99	5 (3–8)	15 (9–23)	35 (19–63)	9 (6–15)	5 (4–6)	11 (4–24)	23 (17–30)	6 (3–15)	55 (38–82)	1 (1–2)
1999–00	8 (6–12)	5 (2–12)	12 (4–32)	<1 (0–2)	1 (0–2)	10 (4–26)	2 (1–5)	1 (1–3)	1 (0–2)	<1 (0–1)
2000–01	3 (2–4)	7 (4–12)	23 (13–49)	14 (7–32)	8 (6–10)	19 (11–33)	3 (2–5)	15 (6–47)	2 (1–5)	1 (1–2)
2001–02	<1 (0–5)	45 (33–62)	9 (3–24)	2 (1–5)	4 (3–5)	32 (18–55)	4 (2–5)	3 (1–7)	2 (1–5)	1 (1–2)
2002–03	17 (11–24)	79 (64–101)	16 (7–34)	49 (24–94)	16 (14–20)	8 (3–24)	7 (5–9)	2 (1–5)	7 (4–12)	8 (7–10)
2003–04	<1 (0–3)	3 (1–8)	6 (1–22)	91 (47–171)	9 (7–11)	2 (0–9)	1 (1–3)	<1 (0–4)	3 (1–8)	4 (3–5)
2004–05	17 (13–24)	6 (4–11)	5 (1–23)	<1 (0–3)	10 (8–11)	3 (1–9)	5 (4–7)	<1 (0–2)	2 (1–4)	8 (7–9)
2005–06	6 (2–15)	15 (10–21)	7 (2–22)	<1 (0–3)	10 (9–12)	20 (10–40)	9 (7–12)	<1 (0–4)	3 (2–6)	11 (10–13)
2006–07	5 (3–7)	9 (5–18)	4 (1–15)	<1 (0–6)	10 (8–13)	4 (1–14)	10 (7–13)	<1 (0–3)	2 (1–5)	9 (7–11)
2007–08	4 (3–6)	3 (2–5)	3 (1–8)	<1 (0–1)	4 (4–5)	1 (0–6)	1 (1–2)	<1 (0–2)	1 (0–2)	12 (10–13)
2008–09	2 (1–5)	1 (1–3)	3 (1–11)	<1 (0–1)	8 (6–9)	1 (0–3)	4 (3–5)	<1 (0–3)	2 (1–4)	7 (6–8)
2009–10	2 (1–3)	4 (3–6)	5 (2–16)	<1 (0–0)	6 (5–7)	1 (0–4)	1 (1–2)	<1 (0–3)	2 (1–3)	12 (10–13)
2010–11	1 (1–2)	6 (4–8)	2 (1–8)	<1 (0–0)	12 (11–14)	1 (0–4)	9 (7–10)	<1 (0–1)	5 (4–8)	12 (11–14)
2011–12	3 (1–5)	2 (1–3)	3 (1–9)	<1 (0–1)	2 (1–2)	1 (0–3)	7 (6–8)	<1 (0–0)	3 (2–5)	4 (3–4)
2012–13	1 (1–3)	3 (2–4)	1 (0–4)	<1 (0–0)	4 (3–4)	3 (1–6)	3 (2–4)	1 (0–5)	2 (1–3)	10 (9–11)
2013–14	11 (8–14)	2 (1–4)	2 (1–6)	<1 (0–0)	4 (4–5)	2 (1–3)	5 (4–7)	<1 (0–0)	2 (2–4)	5 (5–6)
2014–15	9 (7–13)	2 (2–5)	3 (1–7)	<1 (0–0)	6 (5–6)	2 (1–4)	3 (2–4)	<1 (0–2)	3 (2–4)	5 (5–6)
2015–16	16 (12–20)	4 (3–6)	5 (2–10)	<1 (0–0)	4 (4–5)	5 (3–8)	1 (1–2)	<1 (0–0)	1 (1–2)	4 (3–4)
2016–17	17 (13–22)	2 (1–3)	2 (1–6)	<1 (0–0)	6 (5–7)	<1 (0–2)	8 (7–10)	<1 (0–2)	2 (1–3)	3 (3–4)
slope	–0.03	–0.01	–0.04	–0.07	0.05	–0.03	0.01	–0.23	–0.02	0.18

	NCA	ASR	SSI	THR	LDO	BCO	STN	PIG	SUN	TOA
1990–91	<1 (0–3)	<1 (0–2)	1 (0–3)	2 (0–22)	<1 (0–2)	1 (0–2)	1 (0–4)	2 (1–3)	4 (1–16)	1 (0–1)
1991–92	<1 (0–3)	<1 (0–4)	<1 (0–1)	4 (0–30)	1 (0–4)	2 (1–3)	4 (1–13)	<1 (0–1)	3 (0–17)	1 (0–1)
1992–93	<1 (0–1)	<1 (0–1)	<1 (0–1)	5 (1–14)	1 (1–3)	5 (3–8)	1 (0–6)	<1 (0–0)	2 (0–14)	1 (1–2)
1993–94	<1 (0–4)	<1 (0–2)	<1 (0–1)	10 (1–67)	2 (1–3)	<1 (0–1)	1 (0–15)	1 (0–1)	2 (0–9)	1 (0–2)
1994–95	<1 (0–4)	<1 (0–5)	2 (1–4)	3 (0–25)	1 (0–10)	2 (1–4)	2 (1–9)	<1 (0–1)	6 (1–25)	<1 (0–1)
1995–96	8 (5–12)	1 (0–6)	1 (0–2)	7 (1–42)	1 (0–13)	<1 (0–2)	12 (4–37)	<1 (0–1)	1 (0–10)	1 (1–1)
1996–97	<1 (0–3)	<1 (0–3)	<1 (0–1)	10 (2–33)	<1 (0–2)	15 (10–22)	4 (2–9)	<1 (0–0)	6 (1–29)	<1 (0–1)
1997–98	1 (0–5)	<1 (0–3)	1 (0–4)	6 (1–27)	1 (0–4)	3 (1–6)	2 (0–6)	<1 (0–1)	2 (0–16)	<1 (0–0)
1998–99	<1 (0–1)	35 (11–106)	<1 (0–1)	6 (1–25)	9 (3–22)	2 (1–4)	2 (0–16)	<1 (0–1)	6 (2–21)	<1 (0–1)
1999–00	<1 (0–1)	<1 (0–3)	<1 (0–1)	12 (4–43)	17 (6–50)	1 (0–2)	1 (0–12)	<1 (0–1)	1 (0–9)	<1 (0–0)
2000–01	<1 (0–1)	1 (0–2)	4 (3–6)	7 (2–26)	17 (9–46)	4 (2–7)	1 (0–5)	1 (1–2)	7 (2–27)	<1 (0–1)
2001–02	<1 (0–1)	4 (2–6)	1 (1–3)	3 (0–16)	3 (1–13)	1 (0–2)	2 (0–10)	1 (1–2)	4 (1–19)	1 (0–1)
2002–03	29 (15–56)	18 (15–23)	15 (12–19)	3 (0–21)	4 (2–9)	2 (1–5)	1 (0–10)	6 (5–8)	6 (1–37)	7 (5–9)
2003–04	11 (6–20)	3 (2–5)	2 (1–3)	2 (0–14)	4 (2–8)	7 (3–16)	5 (1–17)	2 (1–3)	1 (0–6)	1 (0–1)
2004–05	<1 (0–2)	10 (8–13)	11 (10–14)	1 (0–15)	1 (1–3)	2 (1–3)	8 (3–20)	5 (5–7)	3 (0–18)	2 (1–2)
2005–06	1 (0–2)	4 (3–5)	13 (11–16)	1 (0–21)	5 (3–9)	2 (1–4)	5 (1–19)	7 (6–8)	2 (0–14)	10 (9–12)
2006–07	52 (25–98)	7 (5–9)	14 (11–17)	3 (0–18)	14 (9–22)	8 (5–13)	2 (0–9)	6 (5–7)	1 (0–12)	6 (5–8)
2007–08	1 (1–3)	3 (3–5)	4 (3–5)	2 (0–11)	1 (0–4)	3 (2–4)	2 (0–9)	3 (2–3)	1 (0–5)	2 (1–2)
2008–09	<1 (0–1)	1 (0–1)	2 (1–2)	<1 (0–9)	1 (0–2)	2 (1–3)	3 (1–8)	7 (6–8)	1 (0–6)	3 (3–4)
2009–10	3 (2–7)	2 (1–2)	4 (3–5)	2 (0–8)	3 (1–6)	2 (1–3)	3 (0–13)	4 (4–5)	1 (0–5)	3 (3–4)
2010–11	<1 (0–1)	2 (2–3)	5 (5–6)	3 (0–14)	3 (2–5)	11 (8–15)	3 (0–10)	12 (10–14)	1 (0–7)	6 (5–7)
2011–12	<1 (0–0)	1 (1–1)	2 (1–2)	1 (0–9)	1 (0–2)	2 (1–3)	<1 (0–5)	2 (2–3)	1 (0–7)	1 (1–1)
2012–13	<1 (0–1)	2 (1–2)	4 (3–5)	1 (0–5)	<1 (0–1)	1 (1–2)	1 (0–5)	3 (3–4)	3 (0–12)	1 (1–1)
2013–14	<1 (0–0)	1 (1–1)	2 (2–2)	<1 (0–5)	1 (0–1)	1 (1–1)	2 (0–5)	2 (1–2)	3 (0–16)	1 (0–1)
2014–15	<1 (0–0)	1 (1–2)	4 (3–4)	<1 (0–3)	1 (0–1)	2 (1–3)	1 (0–4)	2 (2–3)	1 (0–3)	1 (1–1)
2015–16	<1 (0–0)	1 (1–1)	3 (2–3)	<1 (0–5)	1 (0–1)	<1 (0–1)	7 (4–13)	2 (2–2)	1 (0–4)	2 (1–2)
2016–17	<1 (0–0)	2 (1–2)	3 (3–4)	<1 (0–3)	<1 (0–1)	2 (1–3)	2 (1–6)	3 (3–4)	<1 (0–4)	2 (2–2)
slope	0	0.11	0.13	–0.15	–0.01	0	–0.01	0.14	–0.06	0.08

Southern blue whiting trawl fishery

- Of the 109 bycatch species examined, 33 showed a decrease in catch over time and six were significant; ten showed an increase and one was significant
- Species showing the greatest decline were moonfish (*Lampris guttatus*, MOO), unspecified rattails (RAT), and dark ghost shark (*Hydrolagus novaezealandiae*, GSH) (Figure 5)
- Species showing the greatest increase were opah (*Lampris immaculatus*, PAH), ray's bream (*Brama brama*, RBM*), pale ghost shark (*Hydrolagus bemisi*, GSP*) (Figure 5)
- Most common bycatch species by weight (t) were ling (*Genypterus blacodes*, LIN), hake (*Merluccius australis*, HAK), and hoki (HOK) (Figure 6).
- * Trend not significant

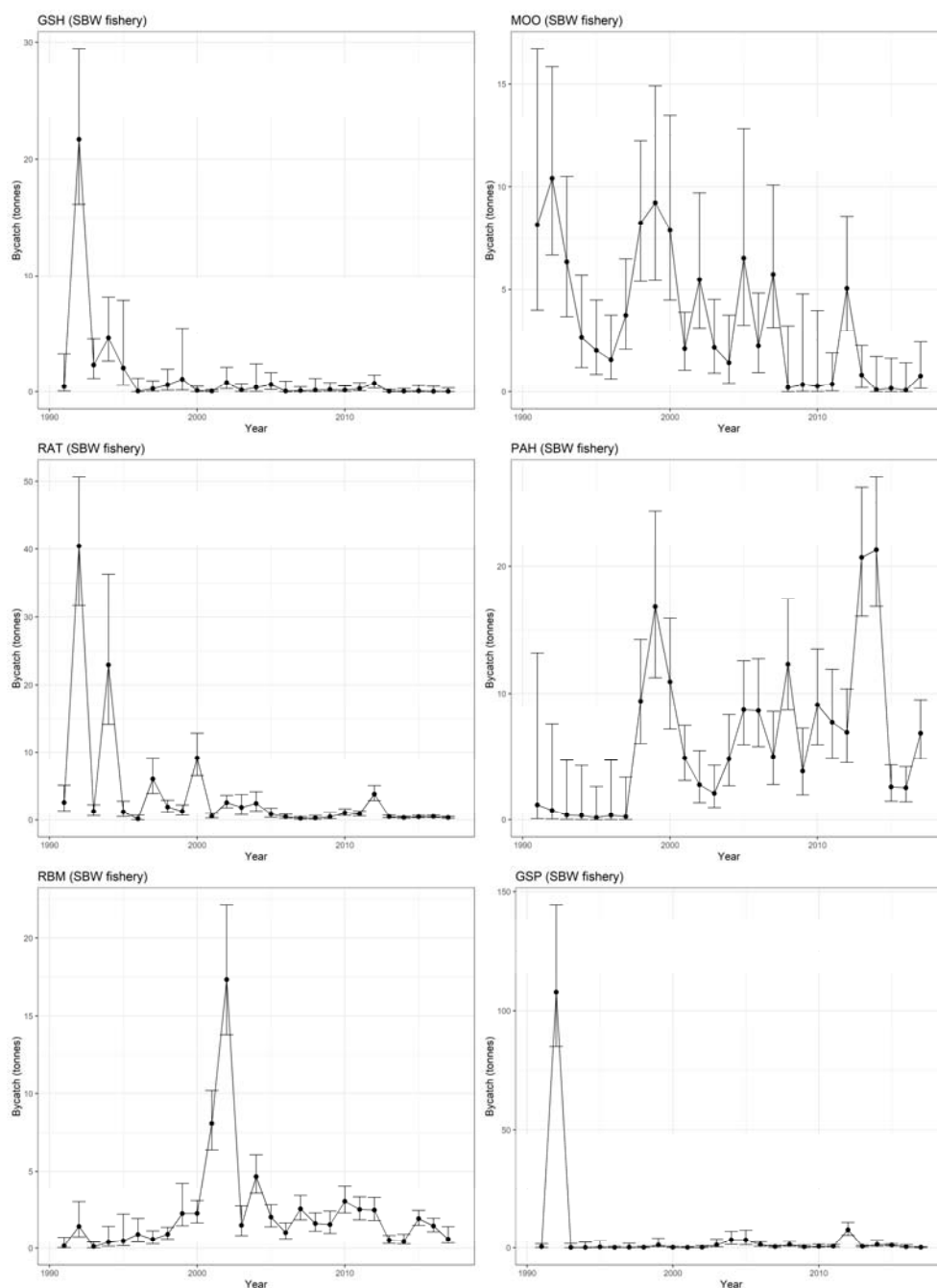


Figure 5: Annual bycatch estimates in the southern blue whiting trawl fishery for the species showing the greatest increases and declines between 1990–91 and 2016–17. See text above for explanation of the species codes. Note: the scale changes on the y-axis between plots.

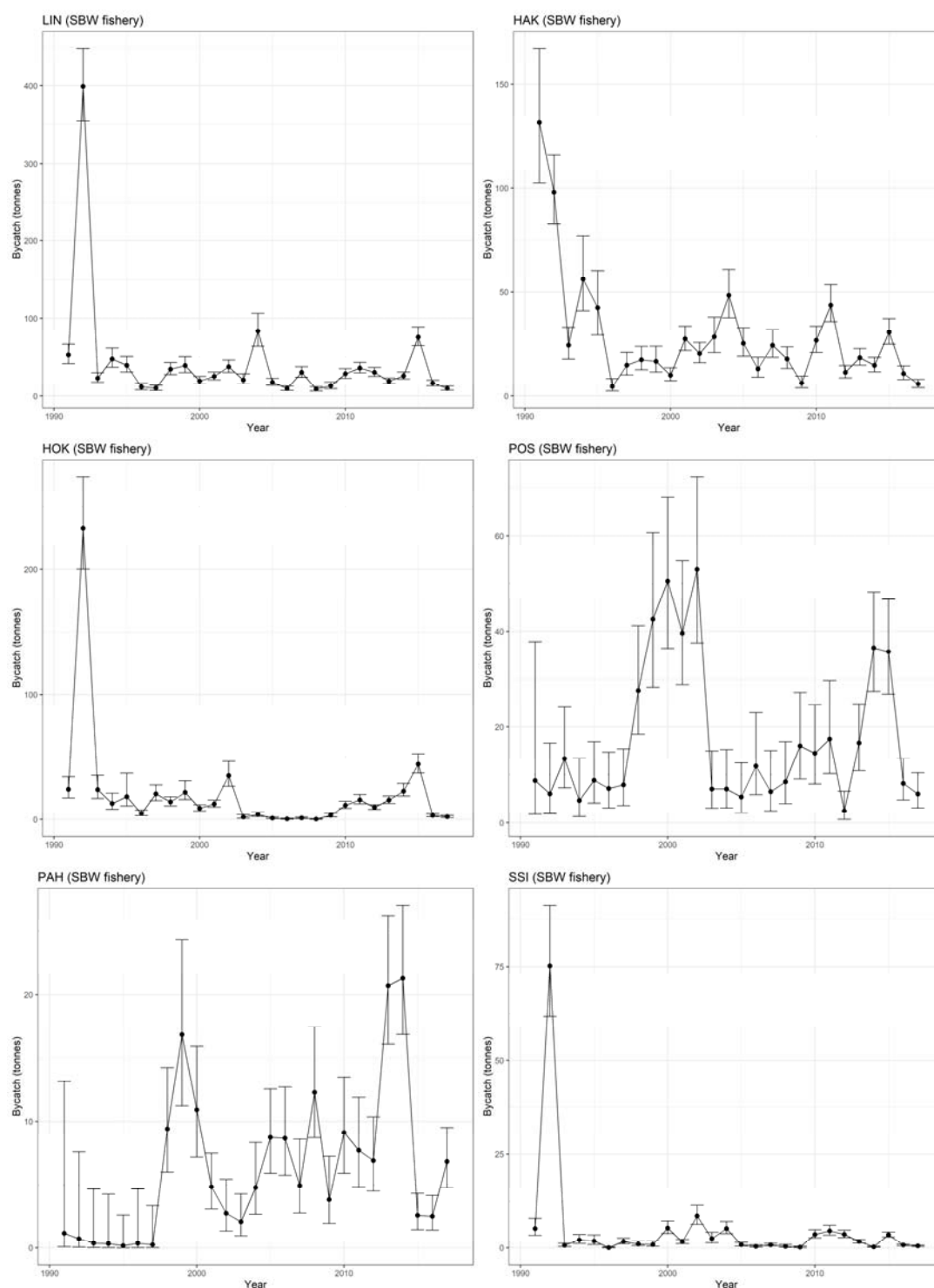


Figure 6: Annual bycatch estimates for the most common southern blue whiting trawl fishery bycatch species by weight between 1990–91 and 2016–17. See <http://marlin.niwa.co.nz> or Table 10 for species code definitions. Note: the scale changes on the y-axis between plots. HAK had a significant decreasing trend, LIN, HOK, and SSI had non-significant decreasing trends, PAH had an increasing significant trend, and POS had an increasing non-significant trend.

Table 2: Southern blue whiting trawl fishery. Total annual bycatch estimates (t) (with estimated 95% CIs) and slope of the regression for the top 50 individual species in this fishery (see <http://marlin.niwa.co.nz> for species code definitions). Species are ordered by decreasing total catch.

	LIN	HAK	HOK	POS	PAH	SSI	GSP	JAV	RAT	MOO
1990–91	53 (42–67)	131 (102–167)	24 (17–34)	9 (2–38)	1 (0–13)	5 (3–8)	<1 (0–2)	2 (1–3)	3 (1–5)	8 (4–17)
1991–92	399 (354–449)	98 (83–116)	233 (200–274)	6 (2–17)	1 (0–8)	75 (62–91)	108 (85–144)	54 (41–72)	40 (32–51)	10 (7–16)
1992–93	23 (18–30)	24 (18–33)	24 (17–35)	13 (7–24)	<1 (0–5)	1 (0–1)	<1 (0–2)	1 (0–2)	1 (1–2)	6 (4–11)
1993–94	48 (37–61)	56 (41–77)	13 (8–21)	5 (1–13)	<1 (0–4)	2 (1–4)	<1 (0–2)	<1 (0–1)	23 (14–36)	3 (1–6)
1994–95	40 (31–51)	42 (29–60)	18 (11–37)	9 (4–17)	<1 (0–3)	2 (1–4)	<1 (0–3)	<1 (0–0)	1 (0–3)	2 (1–4)
1995–96	12 (8–16)	5 (2–8)	5 (3–8)	7 (3–15)	<1 (0–5)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–1)	2 (1–4)
1996–97	10 (7–14)	15 (10–21)	20 (15–28)	8 (4–15)	<1 (0–3)	2 (1–3)	<1 (0–2)	1 (0–2)	6 (4–9)	4 (2–7)
1997–98	35 (28–43)	17 (13–24)	14 (11–18)	28 (18–41)	9 (6–14)	1 (1–2)	<1 (0–1)	<1 (0–0)	2 (1–3)	8 (5–12)
1998–99	39 (30–51)	17 (12–24)	22 (16–31)	43 (28–61)	17 (11–24)	1 (0–2)	1 (0–4)	<1 (0–1)	1 (1–2)	9 (5–15)
1999–00	19 (15–25)	10 (7–14)	9 (7–12)	50 (37–68)	11 (7–16)	5 (4–7)	<1 (0–1)	3 (2–4)	9 (7–13)	8 (4–13)
2000–01	26 (21–31)	27 (22–33)	12 (10–16)	40 (29–55)	5 (3–7)	2 (1–2)	<1 (0–0)	2 (1–3)	1 (0–1)	2 (1–4)
2001–02	38 (31–46)	20 (16–26)	35 (26–46)	53 (38–72)	3 (1–5)	9 (6–11)	<1 (0–1)	5 (3–6)	3 (2–4)	5 (3–10)
2002–03	21 (15–29)	28 (21–38)	2 (1–4)	7 (3–15)	2 (1–4)	3 (1–4)	1 (0–4)	3 (2–5)	2 (1–4)	2 (1–5)
2003–04	83 (64–107)	48 (38–61)	4 (2–6)	7 (3–15)	5 (3–8)	5 (4–7)	3 (1–7)	12 (8–17)	2 (1–4)	1 (0–4)
2004–05	18 (14–23)	25 (19–33)	1 (1–2)	5 (2–12)	9 (6–13)	1 (0–1)	3 (1–8)	1 (1–2)	1 (0–2)	7 (3–13)
2005–06	10 (7–13)	13 (9–19)	<1 (0–1)	12 (6–23)	9 (6–13)	<1 (0–1)	1 (1–3)	1 (0–1)	<1 (0–1)	2 (1–5)
2006–07	31 (24–38)	24 (18–32)	1 (1–2)	6 (3–15)	5 (3–9)	1 (1–1)	<1 (0–1)	1 (1–2)	<1 (0–0)	6 (3–10)
2007–08	9 (7–12)	18 (13–23)	<1 (0–1)	8 (4–17)	12 (9–17)	<1 (0–1)	1 (1–3)	1 (1–2)	<1 (0–1)	<1 (0–3)
2008–09	13 (9–18)	6 (4–10)	3 (2–5)	16 (9–27)	4 (2–7)	<1 (0–0)	<1 (0–1)	1 (0–1)	<1 (0–1)	<1 (0–5)
2009–10	29 (23–35)	27 (21–33)	11 (9–15)	14 (8–25)	9 (6–14)	4 (3–5)	1 (0–2)	1 (1–2)	1 (1–2)	<1 (0–4)
2010–11	36 (30–43)	44 (36–53)	16 (13–20)	17 (10–30)	8 (5–12)	5 (3–6)	1 (0–1)	3 (3–5)	1 (1–1)	<1 (0–2)
2011–12	31 (25–37)	11 (9–15)	10 (8–12)	3 (1–7)	7 (5–10)	4 (3–5)	8 (5–11)	3 (2–4)	4 (3–5)	5 (3–9)
2012–13	19 (16–23)	18 (15–23)	16 (13–19)	17 (11–25)	21 (16–26)	2 (1–2)	1 (0–1)	1 (1–1)	<1 (0–1)	1 (0–2)
2013–14	26 (22–31)	15 (12–18)	22 (19–29)	37 (27–48)	21 (17–27)	<1 (0–0)	1 (1–3)	<1 (0–0)	<1 (0–1)	<1 (0–2)
2014–15	75 (65–89)	30 (25–37)	44 (37–52)	36 (27–47)	3 (1–4)	4 (3–4)	1 (1–2)	4 (3–5)	<1 (0–1)	<1 (0–2)
2015–16	17 (13–21)	11 (8–14)	3 (2–4)	8 (5–13)	3 (1–4)	1 (1–1)	<1 (0–1)	1 (1–2)	<1 (0–1)	<1 (0–1)
2016–17	10 (7–13)	6 (4–8)	2 (2–3)	6 (3–10)	7 (5–10)	<1 (0–1)	<1 (0–0)	1 (0–1)	<1 (0–1)	1 (0–2)
slope	–0.03	–0.04	–0.07	0.01	0.15	–0.07	0.03	0.02	–0.15	–0.15

	RBM	SPD	WSQ	SQU	WWA	GSH	LCH	LDO	MAN	BTH
1990–91	<1 (0–1)	10 (6–15)	8 (6–11)	2 (1–3)	1 (0–1)	<1 (0–3)	<1 (0–1)	1 (0–2)	<1 (0–1)	<1 (0–2)
1991–92	1 (1–3)	10 (8–13)	15 (12–18)	6 (5–7)	27 (21–34)	22 (16–29)	12 (9–15)	12 (10–15)	10 (8–13)	10 (6–18)
1992–93	<1 (0–0)	1 (1–2)	1 (0–1)	1 (0–1)	1 (0–2)	2 (1–5)	1 (0–2)	<1 (0–1)	<1 (0–0)	<1 (0–1)
1993–94	<1 (0–1)	3 (1–6)	1 (0–2)	1 (0–1)	1 (1–3)	5 (3–8)	2 (1–3)	1 (0–1)	<1 (0–1)	<1 (0–1)
1994–95	<1 (0–2)	1 (0–2)	<1 (0–0)	<1 (0–0)	<1 (0–0)	2 (1–8)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–1)
1995–96	1 (0–2)	<1 (0–1)	1 (0–2)	<1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–1)
1996–97	1 (0–1)	1 (1–2)	1 (0–2)	1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)
1997–98	1 (1–1)	2 (1–3)	<1 (0–1)	3 (2–5)	<1 (0–1)	1 (0–2)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–1)
1998–99	2 (1–4)	1 (1–3)	1 (0–1)	3 (2–5)	1 (0–1)	1 (0–5)	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–1)
1999–00	2 (2–3)	1 (1–2)	1 (0–1)	2 (1–2)	<1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–1)
2000–01	8 (6–10)	1 (1–2)	1 (1–2)	2 (1–2)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–1)
2001–02	17 (14–22)	3 (2–5)	5 (4–7)	5 (4–7)	<1 (0–1)	1 (0–2)	<1 (0–1)	1 (1–2)	1 (0–2)	<1 (0–1)
2002–03	1 (1–3)	1 (1–2)	1 (0–1)	1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–1)	<1 (0–1)
2003–04	5 (4–6)	2 (1–3)	3 (2–4)	2 (1–3)	1 (0–2)	<1 (0–2)	<1 (0–1)	1 (0–1)	<1 (0–0)	<1 (0–1)
2004–05	2 (1–3)	1 (0–1)	1 (0–1)	<1 (0–1)	<1 (0–0)	1 (0–2)	1 (0–2)	1 (0–1)	<1 (0–0)	<1 (0–1)
2005–06	1 (1–2)	<1 (0–1)	1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–1)	1 (1–2)	1 (0–1)	<1 (0–0)	<1 (0–1)
2006–07	3 (2–3)	1 (1–2)	1 (1–2)	1 (1–1)	1 (1–2)	<1 (0–0)	1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–1)
2007–08	2 (1–2)	1 (0–1)	1 (1–2)	<1 (0–1)	<1 (0–0)	<1 (0–1)	1 (0–2)	<1 (0–0)	<1 (0–0)	<1 (0–1)
2008–09	2 (1–2)	3 (2–4)	1 (0–1)	1 (1–2)	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–1)
2009–10	3 (2–4)	4 (3–5)	1 (1–2)	1 (1–2)	1 (1–1)	<1 (0–1)	<1 (0–0)	1 (0–1)	<1 (0–0)	<1 (0–1)
2010–11	3 (2–3)	3 (2–3)	2 (1–2)	2 (2–2)	1 (1–2)	<1 (0–1)	<1 (0–1)	1 (0–1)	<1 (0–0)	<1 (0–1)
2011–12	2 (2–3)	4 (3–5)	2 (1–2)	1 (1–2)	2 (2–3)	1 (0–1)	1 (1–2)	1 (0–1)	<1 (0–0)	<1 (0–1)
2012–13	1 (0–1)	2 (1–2)	1 (1–1)	1 (0–1)	<1 (0–1)	<1 (0–0)	1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–1)
2013–14	<1 (0–1)	<1 (0–1)	<1 (0–0)	1 (1–2)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–1)
2014–15	2 (1–2)	1 (1–1)	3 (2–4)	2 (1–2)	<1 (0–1)	<1 (0–1)	1 (1–1)	<1 (0–1)	<1 (0–0)	<1 (0–1)
2015–16	1 (1–2)	1 (0–1)	2 (1–2)	2 (2–3)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)
2016–17	1 (0–1)	1 (0–1)	1 (1–1)	1 (1–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
slope	0.06	–0.03	–0.01	0	–0.06	–0.11	–0.02	–0.04	–0.04	–0.03

	MAK	ETB	ONG	RCO	SBO	CBO	RSK	SKA	PIG	HYA
1990–91	1 (0–11)	<1 (0–1)	<1 (0–1)	1 (0–1)	<1 (0–1)	5 (3–8)	<1 (0–1)	<1 (0–0)	3 (2–5)	<1 (0–1)
1991–92	1 (0–10)	8 (4–13)	6 (2–14)	2 (1–2)	<1 (0–1)	<1 (0–1)	<1 (0–1)	2 (1–4)	1 (1–2)	<1 (0–1)
1992–93	<1 (0–5)	<1 (0–0)	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–1)
1993–94	<1 (0–4)	<1 (0–0)	<1 (0–1)	<1 (0–1)	7 (3–18)	<1 (0–0)	<1 (0–1)	3 (1–5)	<1 (0–0)	<1 (0–0)
1994–95	<1 (0–3)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
1995–96	<1 (0–4)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
1996–97	<1 (0–5)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
1997–98	3 (1–8)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
1998–99	<1 (0–5)	<1 (0–0)	<1 (0–4)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–1)
1999–00	<1 (0–3)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
2000–01	<1 (0–3)	<1 (0–0)	<1 (0–2)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
2001–02	<1 (0–5)	<1 (0–0)	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–0)	1 (0–2)	<1 (0–0)	<1 (0–0)	<1 (0–1)
2002–03	2 (0–8)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
2003–04	<1 (0–4)	<1 (0–0)	2 (0–4)	1 (1–2)	<1 (0–0)	<1 (0–0)	3 (1–8)	<1 (0–0)	<1 (0–0)	<1 (0–0)
2004–05	<1 (0–4)	1 (0–4)	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)
2005–06	<1 (0–3)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
2006–07	<1 (0–3)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
2007–08	<1 (0–3)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–2)	<1 (0–0)	<1 (0–0)	<1 (0–1)
2008–09	<1 (0–5)	<1 (0–0)	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–2)	<1 (0–0)	<1 (0–0)	<1 (0–1)
2009–10	1 (0–6)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)
2010–11	<1 (0–5)	<1 (0–0)	<1 (0–0)	1 (0–1)	<1 (0–0)	<1 (0–0)	1 (0–2)	<1 (0–0)	<1 (0–0)	<1 (0–0)
2011–12	<1 (0–3)	<1 (0–0)	1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	2 (1–4)
2012–13	2 (0–7)	<1 (0–0)	<1 (0–0)	1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
2013–14	<1 (0–3)	<1 (0–0)	<1 (0–0)	1 (1–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
2014–15	<1 (0–2)	<1 (0–0)	<1 (0–0)	1 (1–2)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
2015–16	<1 (0–2)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
2016–17	<1 (0–2)	<1 (0–0)	<1 (0–0)	1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	1 (0–2)
slope	–0.02	–0.03	–0.02	0.03	–0.03	–0.03	0.01	–0.04	–0.04	0.03

	MIQ	BOA	BSH	GIZ	HCO	TOP	BBE	CON	CSQ	GSQ
1990–91	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–5)
1991–92	3 (2–5)	2 (0–5)	2 (1–3)	1 (1–2)	2 (1–2)	2 (2–3)	1 (0–1)	1 (1–2)	1 (0–2)	<1 (0–5)
1992–93	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–2)
1993–94	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	1 (0–6)
1994–95	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–1)
1995–96	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)
1996–97	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)
1997–98	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–2)
1998–99	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–3)
1999–00	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–2)
2000–01	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)
2001–02	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–2)
2002–03	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)
2003–04	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–2)
2004–05	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–2)
2005–06	<1 (0–0)	<1 (0–0)	<1 (0–2)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)
2006–07	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)
2007–08	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–3)
2008–09	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–3)
2009–10	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–2)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–2)
2010–11	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–1)
2011–12	<1 (0–0)	<1 (0–0)	<1 (0–0)	1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–4)
2012–13	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)
2013–14	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)
2014–15	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–2)
2015–16	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)
2016–17	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–2)
slope	–0.02	–0.02	–0.02	–0.01	–0.02	–0.02	–0.02	–0.02	–0.02	–0.01

	POM	SPI	SQX	SRB	SSK	STU	WIT	AGR	ANT	API
1990–91	<1 (0–0)	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–1)	1 (0–3)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
1991–92	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	1 (0–2)	<1 (0–1)	<1 (0–2)	<1 (0–0)	<1 (0–0)	<1 (0–0)
1992–93	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
1993–94	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
1994–95	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
1995–96	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
1996–97	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
1997–98	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
1998–99	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)
1999–00	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
2000–01	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
2001–02	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)
2002–03	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
2003–04	<1 (0–0)	1 (0–4)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–1)	1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–0)
2004–05	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–1)	<1 (0–2)	<1 (0–0)	<1 (0–0)	<1 (0–0)
2005–06	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
2006–07	1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)
2007–08	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
2008–09	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
2009–10	<1 (0–0)	<1 (0–0)	1 (1–2)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)
2010–11	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
2011–12	<1 (0–0)	<1 (0–0)	<1 (0–0)	1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
2012–13	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
2013–14	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
2014–15	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
2015–16	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
2016–17	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
slope	0	0	0.01	0.01	–0.02	–0.02	0	0	0	0

Scampi trawl fishery

- Of the 332 bycatch species examined, 104 showed a decrease in catch over time and 34 were significant; 148 showed an increase and 58 were significant
- Species showing the greatest decline were skates (Rajidae and Arhynchobatidae, SKA), bluenose (*Hyperoglyphe antarctica*, BNS) and hapuku and bass (*Polyprion oxygeneios* & *P. americanus*, HPB) (Figure 7)
- Species showing the greatest increase were geometric star (*Psilaster acuminatus*, PSI), smooth deepsea anemones (Actinostolidae, ACS), Garrick's masking crab (*Leptomithrax garricki*, GMC) (Figure 7)
- Most common bycatch species by weight (t) were javelinfish (JAV), unspecified rattails (RAT), and sea perch (SPE) (Figure 8).

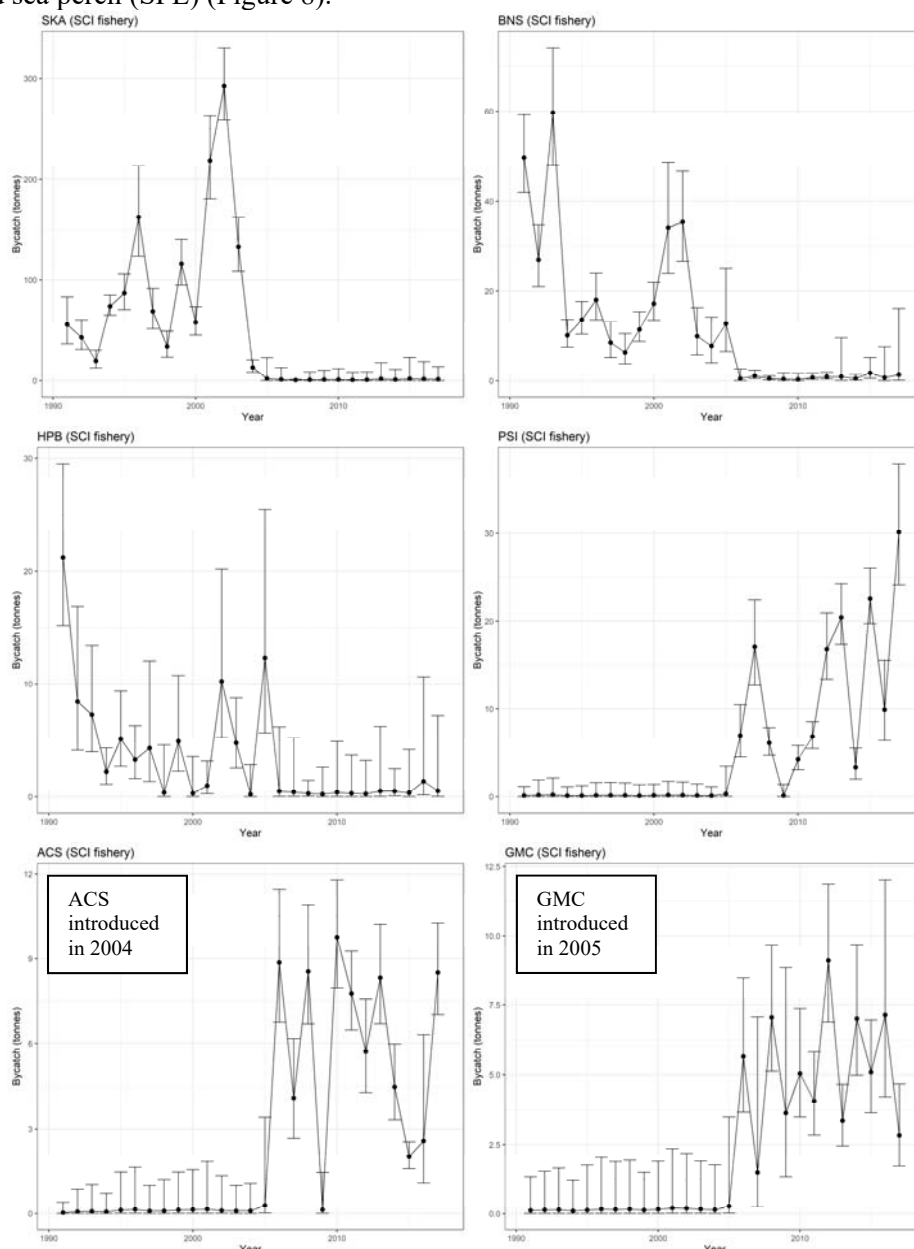


Figure 7: Annual bycatch estimates in the scampi trawl fishery for the species showing the greatest increases and declines between 1990–91 and 2016–17. See text above for explanation of the species codes. The codes ACS and GMC were introduced in 2004 and 2005, respectively, so no catches were reported under these codes prior to the introduction dates. Note: the scale changes on the y-axis between plots.

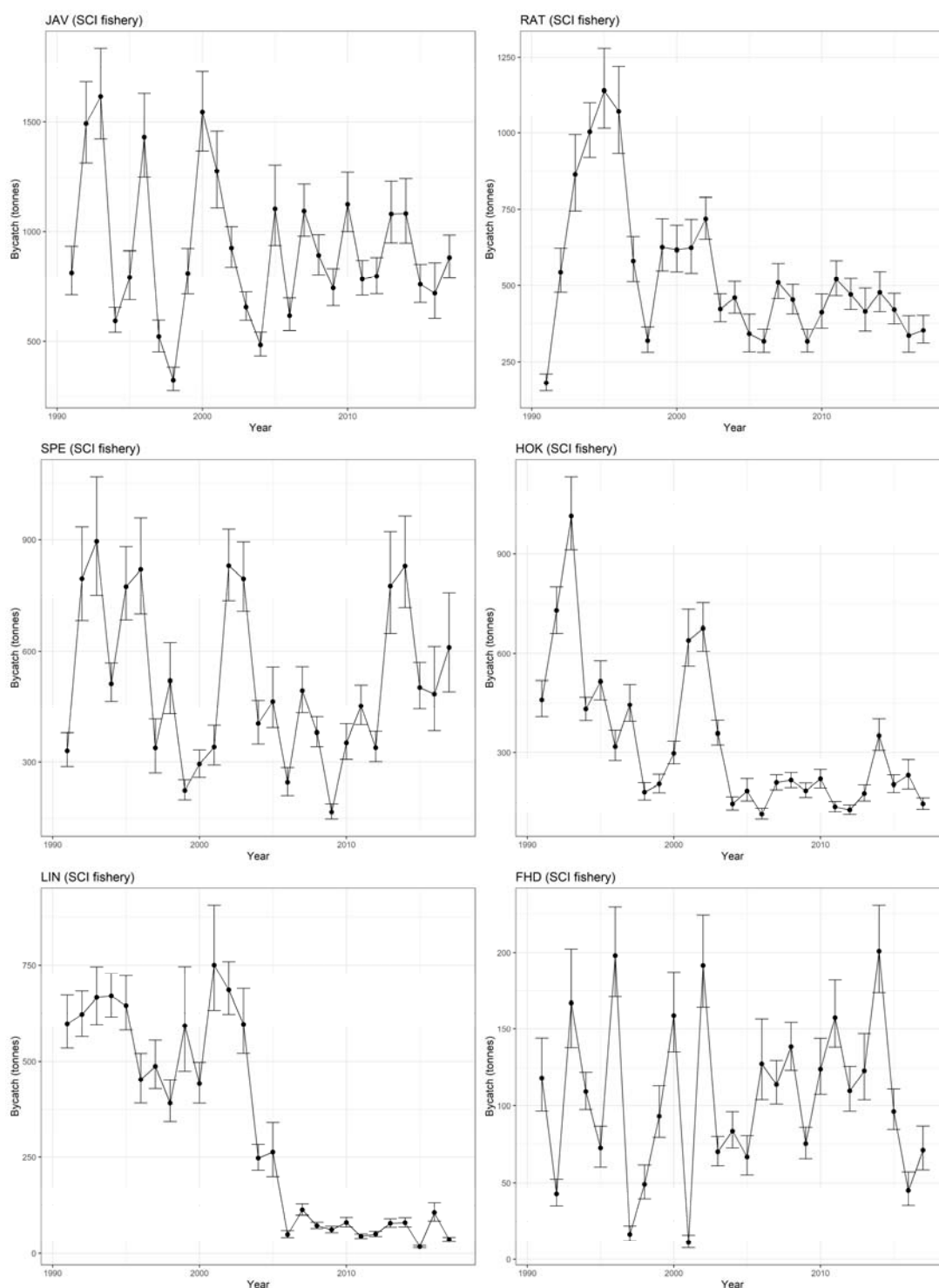


Figure 8: Annual bycatch estimates for the most common scampi trawl fishery bycatch species by weight between 1990–91 and 2016–17. See <http://marlin.niwa.co.nz> or Table 10 for species code definitions. Note: the scale changes on the y-axis between plots. RAT and HOK had significant decreasing trends, SPE and LIN had non-significant decreasing trends, FHD had an increasing non-significant trend, and JAV showed no trend.

Table 3: Scampi trawl fishery. Total annual bycatch estimates (t) (with estimated 95% CIs) and slope of the regression for the top 50 individual species in this fishery (see <http://marlin.niwa.co.nz> for species code definitions). Species are ordered by decreasing total catch.

	JAV	RAT	SPE	HOK	LIN	FHD	GSH	GIZ	SSK	RCO
1990–91	815 (713–933)	181 (155–211)	331 (288–380)	460 (408–518)	597 (534–672)	118 (97–144)	10 (6–15)	101 (85–120)	150 (119–188)	24 (20–28)
1991–92	1493 (1316–1684)	544 (477–621)	795 (681–934)	728 (661–801)	622 (564–682)	43 (35–52)	147 (126–172)	305 (273–340)	48 (37–62)	127 (113–142)
1992–93	1618 (1422–1839)	864 (745–994)	896 (749–1068)	1013 (912–1133)	666 (595–746)	167 (138–202)	205 (173–241)	296 (262–334)	154 (128–186)	89 (77–103)
1993–94	595 (542–658)	1003 (921–1100)	513 (465–568)	431 (396–468)	669 (615–728)	109 (98–122)	77 (68–86)	224 (204–246)	32 (25–42)	199 (181–220)
1994–95	794 (691–915)	1139 (1015–1280)	773 (683–881)	515 (460–578)	645 (580–723)	72 (60–87)	86 (71–103)	158 (138–182)	86 (70–103)	151 (133–172)
1995–96	1430 (1249–1633)	1071 (934–1219)	819 (699–957)	318 (275–367)	453 (391–519)	198 (171–230)	106 (90–126)	150 (128–175)	45 (34–59)	59 (49–71)
1996–97	522 (452–599)	581 (512–659)	339 (271–417)	444 (393–506)	487 (429–554)	16 (12–22)	148 (128–173)	132 (115–152)	66 (46–92)	43 (34–53)
1997–98	326 (278–385)	318 (279–364)	520 (431–624)	181 (157–208)	391 (343–452)	49 (39–62)	79 (66–95)	77 (66–91)	123 (94–162)	36 (30–43)
1998–99	812 (718–923)	624 (548–718)	225 (200–253)	204 (179–234)	591 (474–746)	93 (79–113)	41 (32–52)	62 (50–76)	25 (17–39)	71 (58–86)
1999–00	1546 (1370–1731)	616 (545–696)	294 (259–334)	297 (265–335)	442 (391–497)	159 (135–187)	71 (59–84)	68 (58–81)	163 (133–202)	36 (30–43)
2000–01	1278 (1110–1458)	622 (541–717)	342 (292–399)	640 (561–732)	750 (632–905)	11 (7–16)	98 (80–120)	65 (53–80)	3 (0–26)	83 (68–101)
2001–02	925 (840–1022)	718 (651–789)	829 (734–928)	676 (607–752)	685 (621–759)	192 (164–224)	82 (68–100)	130 (111–153)	16 (9–26)	197 (170–226)
2002–03	658 (598–727)	423 (381–472)	794 (706–894)	358 (323–397)	595 (519–689)	70 (61–80)	64 (55–75)	117 (102–136)	72 (54–95)	178 (155–205)
2003–04	483 (433–542)	459 (409–514)	404 (350–467)	146 (128–167)	247 (217–283)	83 (72–96)	56 (48–65)	84 (73–98)	122 (104–145)	160 (138–184)
2004–05	1106 (936–1306)	340 (281–406)	464 (393–557)	185 (155–221)	263 (200–341)	66 (55–80)	148 (118–186)	42 (28–62)	175 (138–218)	27 (18–39)
2005–06	619 (549–699)	315 (279–356)	246 (211–285)	115 (100–132)	49 (41–59)	127 (104–157)	112 (96–132)	58 (47–73)	80 (63–98)	12 (10–15)
2006–07	1095 (979–1218)	510 (457–573)	494 (433–558)	209 (188–232)	113 (100–128)	114 (101–130)	197 (173–223)	51 (43–59)	134 (112–159)	39 (34–45)
2007–08	894 (805–985)	453 (407–504)	380 (342–422)	216 (194–239)	73 (65–82)	138 (123–154)	123 (110–139)	57 (50–66)	80 (68–96)	18 (15–21)
2008–09	745 (665–833)	315 (280–356)	167 (148–189)	185 (165–207)	62 (54–71)	75 (65–86)	68 (60–78)	56 (48–65)	70 (59–84)	15 (12–18)
2009–10	1126 (1000–1273)	412 (360–472)	353 (307–404)	220 (194–248)	81 (69–94)	124 (107–144)	52 (44–62)	19 (15–24)	69 (55–86)	19 (15–23)
2010–11	786 (712–871)	521 (466–581)	452 (401–509)	137 (122–153)	44 (39–50)	157 (138–182)	60 (52–68)	37 (31–43)	60 (50–70)	39 (34–44)
2011–12	799 (718–884)	470 (422–523)	340 (301–383)	128 (114–143)	51 (44–57)	110 (97–126)	130 (114–149)	69 (60–81)	58 (48–70)	29 (25–34)
2012–13	1082 (948–1231)	415 (349–492)	775 (648–922)	177 (154–202)	79 (68–91)	123 (104–147)	98 (85–114)	37 (31–44)	124 (101–153)	20 (17–24)
2013–14	1084 (947–1243)	477 (415–546)	828 (716–962)	351 (306–401)	80 (69–93)	201 (174–231)	242 (211–279)	88 (73–107)	129 (106–156)	52 (44–61)
2014–15	762 (678–853)	421 (374–474)	502 (444–569)	203 (180–232)	17 (15–20)	96 (85–111)	136 (119–153)	71 (62–82)	49 (39–60)	48 (42–55)
2015–16	721 (607–860)	334 (280–401)	485 (384–613)	231 (191–277)	106 (85–131)	45 (35–57)	25 (18–35)	39 (25–59)	112 (85–151)	81 (66–100)
2016–17	884 (791–984)	352 (310–402)	611 (491–757)	146 (130–164)	36 (31–41)	71 (58–87)	85 (75–97)	43 (36–51)	52 (43–64)	33 (28–39)
slope	0	–0.02	–0.01	–0.05	–0.13	0.01	0.01	–0.06	0.01	–0.04

	SPD	SKA	SWA	ASR	CRB	SRH	SQU	HAK	CDO	RSO
1990–91	2 (1–10)	56 (36–83)	50 (41–62)	<1 (0–4)	7 (3–14)	72 (59–87)	13 (11–16)	4 (1–12)	96 (80–114)	93 (79–108)
1991–92	31 (22–41)	43 (31–60)	81 (68–96)	1 (0–5)	19 (14–26)	70 (53–92)	24 (20–28)	40 (34–47)	158 (129–196)	64 (52–78)
1992–93	35 (26–48)	20 (13–30)	140 (119–166)	6 (4–9)	30 (23–38)	25 (17–36)	21 (17–25)	52 (43–61)	15 (6–37)	58 (46–72)
1993–94	41 (33–50)	74 (65–85)	76 (65–89)	37 (29–48)	42 (35–52)	14 (10–18)	33 (29–37)	45 (39–52)	15 (12–20)	15 (11–19)
1994–95	33 (26–41)	87 (71–106)	126 (106–151)	5 (2–13)	116 (93–145)	48 (40–59)	61 (53–73)	124 (105–146)	14 (9–21)	20 (16–24)
1995–96	55 (42–73)	162 (124–213)	74 (58–91)	298 (214–417)	104 (82–130)	43 (34–54)	29 (24–35)	42 (33–54)	14 (10–19)	34 (27–44)
1996–97	168 (127–224)	69 (52–91)	31 (18–51)	129 (107–153)	58 (46–73)	2 (0–15)	7 (5–9)	62 (51–75)	1 (0–2)	65 (49–86)
1997–98	23 (17–30)	34 (23–49)	37 (29–48)	70 (52–94)	56 (47–67)	16 (8–33)	20 (17–24)	37 (31–44)	2 (1–2)	12 (8–17)
1998–99	6 (3–13)	116 (95–140)	26 (20–34)	14 (12–17)	26 (22–30)	10 (6–14)	28 (20–38)	46 (35–60)	16 (12–20)	32 (26–40)
1999–00	91 (70–117)	58 (45–73)	71 (58–86)	41 (32–52)	54 (45–65)	16 (12–22)	22 (17–28)	62 (49–77)	3 (2–4)	28 (23–33)
2000–01	92 (70–124)	219 (181–263)	48 (34–67)	18 (13–24)	50 (40–62)	18 (12–28)	50 (39–62)	45 (36–57)	22 (13–36)	78 (61–98)
2001–02	53 (43–65)	293 (259–331)	160 (134–193)	112 (100–126)	107 (95–122)	20 (13–28)	77 (66–91)	118 (100–138)	40 (32–49)	93 (75–117)
2002–03	70 (59–85)	133 (109–162)	113 (96–132)	49 (42–56)	76 (66–87)	61 (46–82)	29 (25–35)	44 (37–52)	13 (5–34)	63 (40–102)
2003–04	40 (33–49)	13 (8–21)	17 (14–21)	14 (11–17)	79 (67–93)	10 (7–15)	14 (11–17)	43 (36–51)	24 (11–57)	22 (7–68)
2004–05	36 (23–56)	2 (0–23)	7 (2–18)	60 (44–79)	49 (34–71)	34 (25–45)	22 (15–33)	40 (25–66)	2 (0–21)	9 (5–16)
2005–06	42 (34–51)	1 (0–13)	13 (8–21)	18 (14–23)	19 (15–24)	8 (5–13)	30 (25–36)	6 (4–9)	48 (38–60)	17 (12–22)
2006–07	165 (141–192)	1 (0–1)	19 (15–24)	21 (18–25)	19 (14–24)	61 (50–75)	35 (30–40)	20 (16–26)	86 (71–103)	37 (29–46)
2007–08	68 (58–79)	1 (0–9)	5 (3–7)	39 (33–45)	34 (25–46)	61 (49–77)	30 (26–34)	8 (6–11)	42 (35–50)	23 (19–27)
2008–09	91 (75–110)	1 (0–10)	7 (5–9)	37 (32–42)	33 (26–42)	52 (37–73)	25 (21–28)	7 (5–10)	43 (35–53)	7 (5–10)
2009–10	83 (69–99)	1 (0–12)	16 (12–20)	46 (36–59)	2 (1–3)	38 (29–48)	37 (32–43)	10 (8–14)	36 (29–44)	24 (19–30)
2010–11	20 (16–25)	1 (0–8)	7 (5–10)	12 (9–15)	9 (7–12)	58 (47–70)	37 (33–42)	4 (3–6)	31 (27–37)	25 (20–30)
2011–12	31 (24–41)	1 (0–9)	7 (5–10)	18 (14–23)	16 (12–21)	31 (26–38)	34 (29–38)	9 (6–14)	22 (18–27)	13 (10–16)
2012–13	39 (32–47)	2 (0–18)	6 (4–9)	2 (1–3)	2 (1–3)	41 (29–57)	48 (41–55)	18 (14–22)	60 (41–86)	5 (2–11)
2013–14	75 (59–94)	1 (0–11)	6 (4–10)	42 (35–51)	17 (13–22)	26 (20–34)	42 (37–49)	9 (6–14)	31 (26–38)	10 (8–13)
2014–15	146 (127–169)	2 (0–23)	4 (3–5)	4 (2–8)	3 (1–9)	14 (11–18)	29 (25–34)	2 (1–3)	30 (24–37)	14 (2–109)
2015–16	72 (56–91)	2 (0–19)	15 (8–30)	21 (15–28)	23 (17–32)	29 (21–40)	67 (55–82)	2 (1–5)	16 (12–22)	8 (6–11)
2016–17	49 (42–59)	1 (0–14)	6 (4–9)	32 (27–38)	22 (18–26)	45 (35–58)	48 (42–54)	7 (5–9)	17 (12–23)	6 (2–18)
slope	0.05	–0.22	–0.12	0.04	–0.07	0.01	0.03	–0.1	0.03	–0.07

	SSI	TOA	LDO	BBE	RSK	RHY	ANT	MDO	HAG	WWA
1990–91	4 (3–5)	3 (3–4)	14 (12–18)	44 (33–57)	1 (0–6)	10 (8–13)	<1 (0–1)	21 (17–26)	23 (19–28)	<1 (0–4)
1991–92	8 (6–11)	7 (5–9)	26 (21–31)	4 (3–7)	45 (33–59)	7 (5–11)	15 (9–22)	11 (7–15)	23 (18–30)	25 (20–31)
1992–93	32 (26–40)	35 (29–42)	33 (27–39)	10 (6–17)	12 (7–21)	1 (0–4)	9 (5–14)	3 (1–7)	11 (7–15)	17 (13–22)
1993–94	20 (18–23)	21 (18–24)	26 (22–31)	35 (27–43)	4 (2–9)	3 (2–4)	20 (14–29)	1 (0–6)	27 (23–32)	14 (11–17)
1994–95	35 (29–41)	15 (11–21)	61 (53–71)	22 (15–32)	2 (1–6)	3 (2–5)	1 (0–12)	2 (1–4)	7 (5–9)	29 (22–39)
1995–96	24 (19–29)	23 (19–27)	49 (39–61)	27 (18–40)	1 (0–9)	<1 (0–1)	1 (0–13)	18 (13–24)	8 (6–11)	10 (6–15)
1996–97	37 (31–44)	90 (77–104)	70 (58–83)	10 (6–17)	85 (69–102)	1 (0–2)	63 (53–75)	7 (4–12)	16 (12–22)	10 (8–14)
1997–98	24 (20–30)	33 (28–39)	15 (12–18)	15 (11–20)	10 (7–14)	4 (3–6)	45 (34–58)	17 (12–24)	3 (2–6)	14 (11–19)
1998–99	11 (7–15)	101 (83–124)	9 (7–12)	47 (39–56)	5 (1–18)	21 (15–30)	12 (7–19)	19 (13–28)	15 (13–18)	15 (11–21)
1999–00	6 (4–9)	83 (69–99)	37 (30–45)	89 (73–109)	1 (0–9)	52 (42–65)	73 (52–103)	9 (6–13)	23 (19–28)	9 (6–12)
2000–01	17 (14–22)	42 (31–56)	40 (31–52)	72 (56–91)	11 (7–16)	56 (39–81)	12 (5–30)	7 (3–14)	38 (28–52)	28 (21–36)
2001–02	14 (12–17)	54 (45–64)	37 (31–44)	42 (36–51)	9 (5–18)	23 (17–33)	51 (36–72)	49 (34–72)	35 (27–45)	17 (13–22)
2002–03	18 (15–23)	27 (23–32)	20 (16–24)	50 (42–60)	36 (27–50)	22 (16–31)	23 (18–29)	20 (10–39)	35 (24–49)	15 (12–20)
2003–04	23 (19–28)	53 (45–62)	13 (10–16)	48 (40–57)	20 (14–28)	32 (23–44)	8 (5–14)	71 (38–130)	17 (12–25)	7 (5–9)
2004–05	3 (2–7)	6 (4–11)	24 (16–36)	3 (1–5)	85 (54–132)	2 (1–5)	3 (0–36)	10 (6–17)	5 (3–8)	62 (39–96)
2005–06	35 (28–42)	12 (10–14)	21 (16–26)	13 (10–17)	32 (25–42)	55 (43–70)	1 (1–3)	10 (7–14)	4 (3–6)	4 (3–7)
2006–07	36 (31–41)	17 (15–21)	24 (20–28)	5 (3–7)	23 (17–30)	22 (17–28)	29 (23–37)	9 (6–12)	6 (5–8)	20 (15–26)
2007–08	31 (27–36)	16 (13–19)	25 (21–28)	19 (16–23)	30 (25–37)	68 (56–82)	15 (10–22)	15 (12–19)	6 (4–7)	5 (4–8)
2008–09	53 (46–61)	20 (16–24)	15 (12–18)	3 (2–4)	18 (14–22)	32 (26–38)	35 (29–43)	8 (6–11)	5 (4–7)	6 (5–8)
2009–10	35 (29–41)	5 (4–7)	10 (8–13)	10 (8–12)	10 (7–16)	27 (21–34)	3 (1–7)	7 (5–10)	5 (4–6)	4 (2–6)
2010–11	29 (25–33)	10 (9–12)	7 (5–8)	11 (9–14)	21 (17–25)	18 (13–23)	1 (0–7)	10 (8–13)	8 (7–10)	1 (0–2)
2011–12	31 (27–37)	20 (17–24)	17 (14–20)	10 (8–12)	32 (26–39)	28 (22–36)	1 (0–5)	8 (7–11)	7 (6–9)	3 (2–4)
2012–13	33 (28–39)	8 (6–11)	20 (17–24)	26 (21–33)	21 (16–27)	23 (18–30)	2 (2–3)	2 (1–8)	3 (2–5)	5 (4–6)
2013–14	31 (26–38)	7 (5–9)	15 (11–19)	8 (5–10)	35 (28–44)	9 (7–13)	5 (3–9)	9 (7–12)	1 (1–2)	6 (4–10)
2014–15	69 (60–81)	1 (0–5)	16 (13–18)	6 (5–8)	12 (8–18)	9 (6–11)	1 (0–9)	3 (1–11)	4 (2–6)	2 (1–3)
2015–16	45 (31–63)	1 (0–3)	12 (7–19)	10 (7–15)	7 (4–13)	4 (2–8)	7 (5–10)	14 (10–19)	12 (8–16)	6 (3–10)
2016–17	60 (54–68)	8 (6–11)	11 (9–14)	9 (7–12)	42 (35–50)	35 (21–59)	14 (10–19)	11 (3–38)	3 (1–8)	6 (5–8)
slope	0.05	–0.07	–0.04	–0.04	0.07	0.09	–0.02	0	–0.07	–0.03

	FLA	BNS	BEL	CRU	HTH	ERA	CSH	SCH	CAR	DSK
1990–91	<1 (0–1)	50 (42–59)	1 (0–6)	<1 (0–4)	1 (0–7)	13 (9–18)	2 (1–3)	17 (11–26)	<1 (0–1)	2 (2–3)
1991–92	2 (1–4)	27 (21–35)	1 (0–3)	42 (28–63)	<1 (0–2)	8 (5–12)	<1 (0–1)	20 (14–30)	12 (8–16)	3 (2–5)
1992–93	<1 (0–4)	60 (48–74)	11 (7–17)	<1 (0–4)	5 (3–9)	11 (6–20)	3 (2–4)	10 (5–19)	1 (0–3)	34 (22–53)
1993–94	<1 (0–2)	10 (7–14)	3 (2–5)	<1 (0–2)	5 (3–8)	7 (5–10)	3 (2–4)	9 (5–13)	<1 (0–1)	22 (17–29)
1994–95	<1 (0–2)	14 (10–18)	34 (25–46)	<1 (0–2)	1 (0–6)	10 (7–14)	18 (11–30)	8 (5–12)	1 (0–2)	43 (30–61)
1995–96	6 (3–13)	18 (14–24)	13 (9–19)	<1 (0–2)	1 (0–7)	11 (8–17)	2 (1–8)	25 (17–35)	14 (9–22)	<1 (0–3)
1996–97	1 (0–6)	8 (5–13)	1 (0–2)	<1 (0–3)	84 (65–107)	1 (0–5)	33 (27–40)	9 (5–17)	1 (0–4)	59 (45–75)
1997–98	15 (8–27)	6 (4–11)	4 (2–8)	<1 (0–3)	41 (31–54)	3 (1–7)	35 (27–45)	12 (7–21)	<1 (0–1)	21 (15–28)
1998–99	6 (1–51)	11 (9–15)	30 (21–44)	<1 (0–1)	8 (3–17)	5 (3–8)	14 (9–22)	5 (2–9)	4 (2–7)	19 (13–28)
1999–00	19 (9–43)	17 (13–22)	48 (30–75)	<1 (0–1)	1 (0–7)	8 (5–11)	1 (0–3)	19 (13–27)	22 (16–28)	14 (9–20)
2000–01	74 (34–188)	34 (24–49)	47 (29–77)	180 (122–265)	1 (0–5)	28 (17–44)	1 (1–4)	18 (11–32)	26 (17–39)	1 (0–6)
2001–02	29 (18–46)	35 (27–47)	24 (16–36)	78 (59–104)	27 (21–34)	57 (45–71)	1 (0–2)	11 (6–19)	35 (27–46)	1 (0–3)
2002–03	1 (0–4)	10 (6–16)	11 (8–16)	1 (0–2)	19 (14–26)	6 (4–9)	5 (3–7)	22 (13–35)	11 (8–15)	<1 (0–3)
2003–04	<1 (0–8)	8 (4–14)	1 (0–3)	<1 (0–4)	<1 (0–4)	13 (9–18)	7 (4–13)	5 (2–10)	13 (9–17)	<1 (0–3)
2004–05	<1 (0–6)	13 (7–25)	36 (26–50)	<1 (0–4)	2 (0–21)	6 (3–11)	2 (0–18)	9 (3–20)	4 (3–7)	1 (0–7)
2005–06	172 (91–306)	<1 (0–3)	1 (0–2)	<1 (0–3)	9 (7–12)	11 (8–15)	12 (9–17)	4 (1–8)	12 (8–16)	4 (3–6)
2006–07	1 (1–2)	1 (1–2)	4 (2–6)	<1 (0–3)	11 (9–14)	6 (4–9)	53 (42–66)	10 (6–15)	11 (8–14)	<1 (0–3)
2007–08	<1 (0–1)	<1 (0–1)	16 (11–24)	<1 (0–2)	19 (14–26)	5 (3–7)	17 (13–23)	6 (3–9)	8 (7–11)	3 (1–7)
2008–09	<1 (0–0)	<1 (0–2)	1 (1–1)	<1 (0–3)	25 (21–31)	2 (1–3)	13 (10–19)	4 (2–7)	12 (9–16)	3 (2–6)
2009–10	<1 (0–3)	<1 (0–2)	1 (1–2)	<1 (0–3)	7 (6–9)	7 (4–10)	1 (0–1)	7 (4–13)	11 (9–15)	3 (2–5)
2010–11	4 (2–6)	1 (0–2)	5 (4–7)	<1 (0–1)	2 (1–3)	9 (7–11)	19 (15–25)	5 (3–8)	12 (9–15)	2 (2–3)
2011–12	<1 (0–3)	1 (0–2)	14 (10–19)	<1 (0–3)	4 (3–6)	7 (6–10)	22 (16–31)	5 (3–8)	8 (6–11)	2 (2–3)
2012–13	<1 (0–5)	1 (0–10)	2 (1–4)	<1 (0–7)	1 (0–2)	4 (2–7)	<1 (0–2)	5 (2–11)	6 (4–8)	2 (1–4)
2013–14	1 (0–1)	1 (0–1)	1 (0–7)	<1 (0–3)	6 (4–7)	5 (3–7)	<1 (0–5)	10 (6–17)	10 (7–13)	<1 (0–1)
2014–15	<1 (0–3)	2 (1–5)	<1 (0–3)	<1 (0–4)	2 (2–4)	3 (2–5)	1 (0–8)	3 (1–8)	9 (7–11)	5 (3–8)
2015–16	1 (0–8)	1 (0–8)	2 (0–20)	<1 (0–5)	1 (1–2)	23 (16–33)	1 (0–8)	2 (1–9)	6 (3–9)	1 (0–1)
2016–17	1 (0–5)	1 (0–16)	<1 (0–5)	<1 (0–6)	3 (2–4)	3 (1–7)	<1 (0–3)	5 (1–19)	7 (4–10)	<1 (0–3)
slope	–0.04	–0.18	–0.09	–0.07	0.02	–0.02	–0.05	–0.06	0.1	–0.11

	BER	CON	SMK	SDO	CDX	SPI	HSI	OCT	TOP	PRK
1990–91	<1 (0–1)	2 (1–3)	<1 (0–0)	1 (0–2)	1 (0–9)	<1 (0–3)	6 (5–8)	3 (2–5)	<1 (0–1)	<1 (0–4)
1991–92	6 (4–9)	<1 (0–1)	<1 (0–2)	2 (1–5)	1 (0–12)	<1 (0–3)	1 (0–3)	2 (1–3)	1 (0–1)	<1 (0–5)
1992–93	27 (18–39)	3 (1–5)	<1 (0–3)	42 (30–59)	1 (0–9)	1 (0–6)	1 (0–12)	3 (2–5)	<1 (0–2)	3 (0–14)
1993–94	15 (11–20)	21 (18–25)	<1 (0–2)	11 (8–15)	<1 (0–6)	14 (9–25)	3 (1–9)	5 (4–7)	<1 (0–2)	<1 (0–5)
1994–95	42 (32–53)	17 (14–21)	1 (0–7)	3 (1–6)	<1 (0–5)	<1 (0–5)	<1 (0–3)	5 (4–6)	27 (20–35)	1 (0–5)
1995–96	5 (3–8)	5 (3–7)	1 (0–7)	23 (13–40)	<1 (0–6)	42 (23–90)	1 (1–3)	7 (5–9)	2 (1–6)	6 (4–9)
1996–97	6 (2–13)	<1 (0–3)	<1 (0–3)	<1 (0–3)	1 (0–9)	34 (23–59)	<1 (0–3)	2 (1–4)	<1 (0–2)	<1 (0–3)
1997–98	10 (7–14)	6 (4–9)	<1 (0–3)	<1 (0–3)	1 (0–10)	13 (5–35)	5 (2–16)	7 (5–9)	<1 (0–2)	43 (29–64)
1998–99	12 (7–21)	37 (24–63)	1 (0–10)	1 (0–2)	<1 (0–5)	4 (2–8)	<1 (0–3)	2 (1–3)	24 (15–41)	<1 (0–0)
1999–00	21 (16–28)	31 (23–41)	1 (0–6)	<1 (0–3)	<1 (0–7)	<1 (0–5)	3 (2–4)	4 (3–6)	18 (12–26)	<1 (0–4)
2000–01	2 (1–6)	34 (23–51)	1 (0–6)	1 (0–7)	1 (0–7)	1 (0–9)	2 (0–19)	2 (1–4)	5 (3–9)	1 (0–9)
2001–02	8 (6–11)	5 (3–6)	<1 (0–5)	35 (26–47)	1 (0–11)	68 (35–141)	2 (1–5)	15 (12–18)	1 (1–3)	1 (0–6)
2002–03	9 (6–12)	17 (12–26)	<1 (0–4)	16 (10–25)	1 (0–15)	1 (0–7)	3 (0–14)	2 (1–4)	<1 (0–2)	2 (0–19)
2003–04	3 (2–4)	11 (8–16)	<1 (0–4)	4 (2–7)	1 (0–9)	<1 (0–6)	33 (12–84)	88 (64–120)	<1 (0–2)	8 (1–50)
2004–05	3 (2–5)	1 (0–6)	2 (0–19)	38 (28–52)	1 (0–13)	1 (0–7)	17 (12–23)	1 (0–2)	<1 (0–4)	1 (0–5)
2005–06	<1 (0–5)	2 (1–4)	71 (56–89)	2 (1–4)	1 (0–15)	<1 (0–4)	6 (4–8)	4 (2–8)	<1 (0–2)	1 (1–2)
2006–07	1 (0–2)	5 (3–9)	52 (41–67)	4 (2–6)	1 (0–11)	<1 (0–2)	5 (3–6)	3 (2–5)	<1 (0–2)	35 (27–47)
2007–08	2 (1–3)	5 (4–8)	25 (18–35)	<1 (0–1)	20 (12–35)	<1 (0–3)	25 (20–31)	2 (1–2)	2 (1–3)	7 (6–10)
2008–09	3 (2–5)	1 (1–2)	29 (23–37)	<1 (0–1)	<1 (0–6)	2 (1–6)	25 (19–33)	2 (1–3)	<1 (0–1)	5 (3–8)
2009–10	12 (6–22)	7 (5–9)	5 (4–7)	2 (1–3)	106 (74–155)	3 (1–7)	4 (2–7)	2 (1–4)	5 (3–8)	2 (1–3)
2010–11	3 (1–5)	5 (3–7)	8 (5–13)	3 (1–5)	36 (22–60)	<1 (0–3)	14 (12–18)	5 (4–6)	<1 (0–2)	6 (5–8)
2011–12	5 (3–8)	7 (5–10)	3 (2–5)	3 (2–6)	<1 (0–4)	<1 (0–2)	9 (7–11)	3 (2–4)	<1 (0–1)	2 (2–4)
2012–13	5 (4–6)	1 (0–1)	5 (4–7)	2 (1–3)	10 (2–56)	<1 (0–6)	5 (2–14)	1 (1–2)	11 (9–14)	14 (7–29)
2013–14	6 (4–8)	5 (4–8)	<1 (0–5)	2 (1–2)	1 (0–13)	<1 (0–3)	<1 (0–3)	1 (0–1)	35 (24–54)	17 (13–22)
2014–15	5 (4–6)	<1 (0–1)	8 (6–11)	4 (3–6)	1 (0–11)	3 (0–26)	8 (5–13)	3 (2–5)	7 (6–9)	3 (0–20)
2015–16	8 (4–13)	<1 (0–3)	1 (0–8)	1 (1–2)	1 (0–17)	<1 (0–6)	3 (2–4)	<1 (0–4)	22 (16–29)	1 (0–2)
2016–17	17 (13–22)	1 (1–3)	4 (3–6)	1 (0–3)	1 (0–11)	<1 (0–5)	2 (0–21)	2 (1–3)	6 (5–7)	3 (1–21)
slope	–0.01	–0.06	0.16	–0.03	0.08	–0.1	0.07	–0.05	0.08	0.12

Jack mackerel trawl fishery

- Of the 163 bycatch species examined, 56 showed a decrease in catch over time and 30 were significant; 28 showed an increase and seven were significant
- Species showing the greatest decline were dark ghost shark (GSH), red cod (*Pseudophycis bachus*, RCO), and sea perch (SPE) (Figure 9)
- Species showing the greatest increase were albacore tuna (*Thunnus alalunga*, ALB), pilchard (*Sardinops sagax*, PIL), and kingfish (*Seriola lalandi*, KIN) (Figure 9)
- Most common bycatch species by weight (t) were barracouta (*Thyrsites atun*, BAR), frostfish (*Lepidopus caudatus*, FRO), and blue mackerel (*Scomber australasicus*, EMA) (Figure 10).

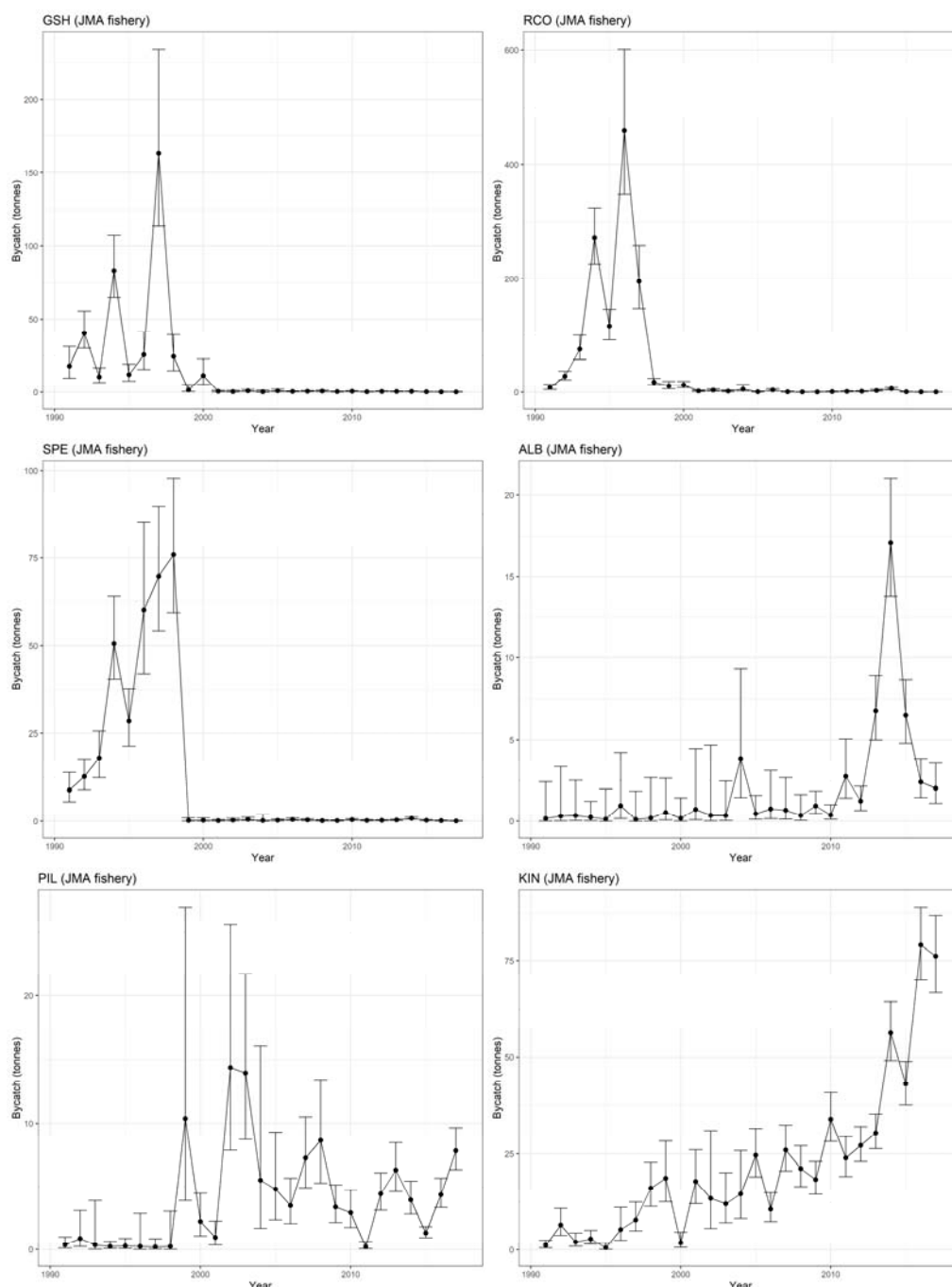


Figure 9: Annual bycatch estimates in the jack mackerel trawl fishery for the species showing the greatest increases and declines between 1990–91 and 2016–17. See text above for explanation of the species codes. Note: the scale changes on the y-axis between plots.

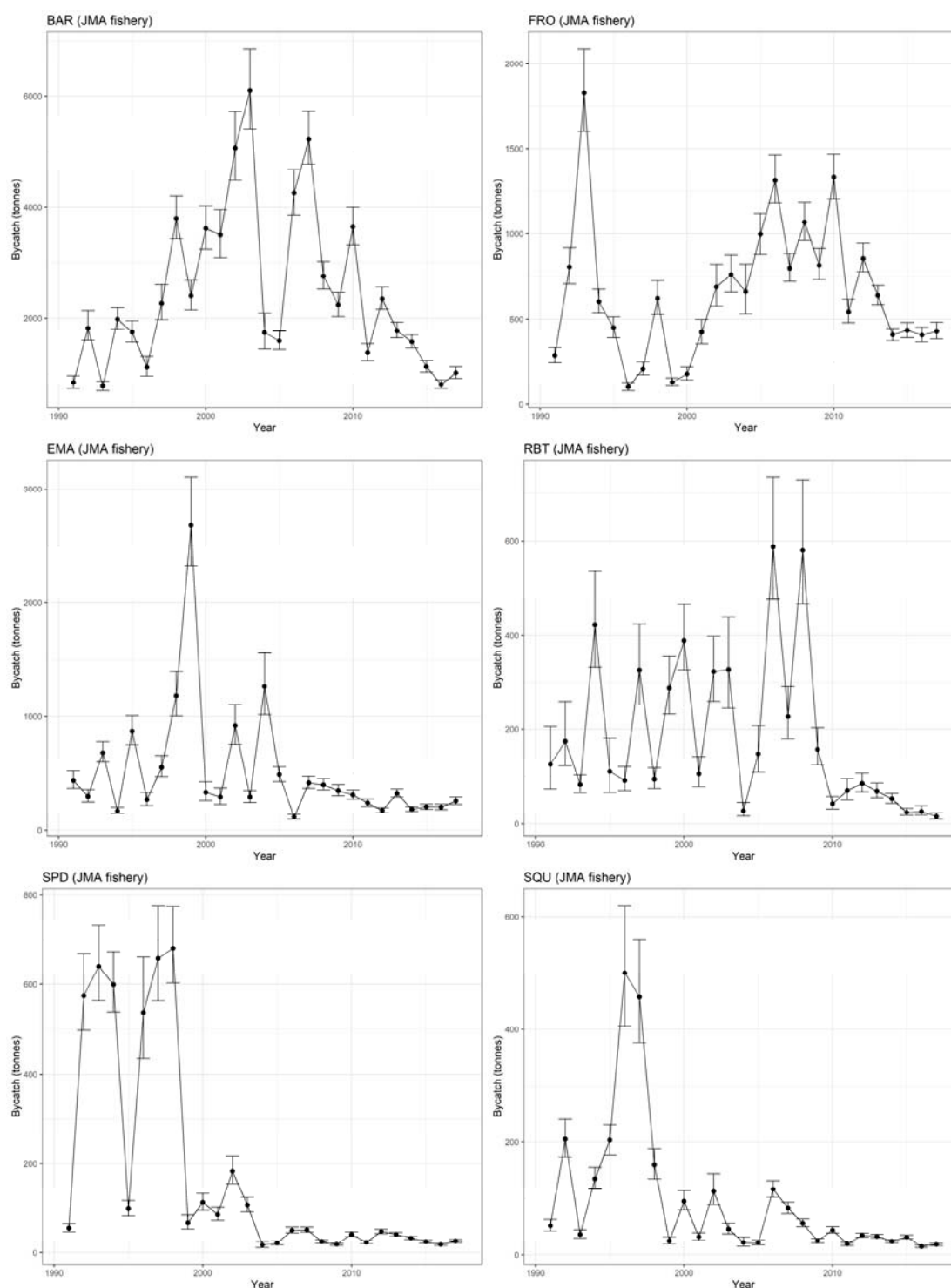


Figure 10: Annual bycatch estimates for the most common jack mackerel trawl fishery bycatch species by weight between 1990–91 and 2016–17. See <http://marlin.niwa.co.nz> or Table 10 for species code definitions. Note: the scale changes on the y-axis between plots. EMA, RBT, SPD, and SQU all had significant decreasing trends, FRO with an increasing non-significant trend, and BAR showed no trend.

Table 4: Jack mackerel trawl fishery. Total annual bycatch estimates (t) (with estimated 95% CIs) and slope of the regression for the top 50 individual species in this fishery (see <http://marlin.niwa.co.nz> for species code definitions). Species are ordered by decreasing total catch.

	BAR	FRO	EMA	RBT	SPD	SQU	NMP	RCO	JDO	SCH
1990–91	840 (733–964)	286 (245–331)	437 (367–521)	125 (74–205)	56 (47–66)	52 (43–64)	39 (27–53)	8 (5–14)	14 (11–17)	42 (30–56)
1991–92	1817 (1601–2137)	807 (707–918)	300 (252–357)	175 (122–260)	575 (496–669)	205 (174–242)	188 (157–227)	28 (22–37)	148 (125–174)	178 (146–218)
1992–93	776 (693–866)	1829 (1600–2089)	681 (597–779)	83 (66–103)	641 (564–731)	37 (30–45)	260 (219–306)	75 (58–100)	200 (171–233)	51 (38–67)
1993–94	1980 (1793–2189)	602 (537–675)	174 (148–204)	422 (332–535)	599 (538–672)	136 (118–156)	214 (187–244)	271 (226–324)	77 (67–91)	168 (142–198)
1994–95	1742 (1560–1953)	449 (389–515)	870 (751–1007)	110 (66–181)	99 (83–117)	203 (177–231)	79 (65–96)	116 (92–146)	31 (26–37)	17 (13–23)
1995–96	1120 (959–1310)	102 (80–129)	272 (221–334)	92 (70–120)	537 (435–661)	501 (406–620)	111 (88–142)	458 (347–601)	54 (41–69)	189 (148–240)
1996–97	2265 (1972–2607)	209 (173–249)	549 (468–655)	326 (250–423)	659 (563–775)	458 (376–560)	219 (176–271)	195 (148–258)	62 (50–78)	130 (102–165)
1997–98	3796 (3426–4200)	621 (528–727)	1187 (1004–1399)	94 (74–118)	680 (603–774)	160 (136–188)	548 (454–663)	18 (13–24)	150 (122–183)	122 (92–159)
1998–99	2401 (2147–2682)	131 (110–156)	2684 (2325–3104)	288 (232–355)	68 (54–85)	25 (19–32)	12 (7–22)	11 (6–19)	3 (1–7)	8 (4–13)
1999–00	3609 (3239–4023)	179 (143–222)	334 (262–426)	389 (326–464)	113 (95–133)	95 (80–114)	7 (4–10)	13 (8–19)	1 (1–2)	12 (8–17)
2000–01	3494 (3092–3956)	422 (353–498)	294 (231–370)	105 (78–142)	86 (73–102)	32 (26–40)	5 (3–8)	2 (1–3)	11 (8–14)	14 (9–20)
2001–02	5064 (4486–5723)	689 (575–823)	919 (755–1109)	323 (260–398)	183 (155–217)	113 (89–145)	15 (11–22)	4 (2–6)	14 (10–19)	25 (18–35)
2002–03	6101 (5399–6861)	763 (659–876)	295 (247–349)	327 (245–438)	107 (92–125)	47 (38–57)	23 (18–29)	2 (1–3)	42 (34–52)	25 (18–34)
2003–04	1734 (1438–2090)	661 (531–824)	1268 (1016–1561)	28 (17–46)	17 (11–25)	22 (15–32)	3 (1–5)	5 (2–13)	9 (7–13)	7 (4–12)
2004–05	1586 (1431–1763)	997 (880–1118)	486 (427–554)	148 (109–208)	21 (18–25)	21 (18–26)	5 (4–7)	1 (0–2)	21 (16–26)	15 (11–19)
2005–06	4253 (3856–4684)	1314 (1182–1465)	117 (98–140)	587 (474–734)	51 (45–58)	117 (103–133)	8 (6–10)	4 (2–6)	25 (22–30)	9 (6–12)
2006–07	5222 (4781–5727)	799 (721–886)	417 (368–473)	227 (180–291)	52 (46–58)	83 (74–94)	24 (21–28)	1 (0–1)	41 (35–48)	14 (11–17)
2007–08	2757 (2522–3020)	1067 (960–1185)	398 (354–454)	579 (465–728)	25 (22–29)	57 (50–64)	17 (14–20)	<1 (0–1)	24 (20–27)	13 (10–16)
2008–09	2236 (2030–2465)	817 (731–914)	348 (305–402)	157 (123–203)	19 (16–22)	25 (22–29)	10 (8–12)	<1 (0–1)	24 (21–28)	10 (8–12)
2009–10	3638 (3318–3998)	1332 (1205–1469)	313 (275–353)	43 (32–58)	41 (36–47)	45 (39–51)	16 (14–19)	1 (0–1)	33 (28–38)	9 (7–12)
2010–11	1375 (1234–1535)	542 (477–616)	243 (212–278)	70 (51–95)	23 (20–27)	19 (16–22)	8 (6–10)	1 (1–2)	17 (14–20)	6 (4–8)
2011–12	2346 (2159–2563)	857 (779–945)	177 (157–200)	85 (68–106)	48 (43–53)	35 (31–39)	12 (11–14)	1 (1–2)	27 (23–30)	8 (7–11)
2012–13	1768 (1639–1922)	638 (584–698)	326 (293–362)	69 (56–86)	41 (37–46)	33 (30–37)	8 (7–9)	3 (2–5)	30 (26–34)	7 (6–9)
2013–14	1569 (1456–1693)	407 (372–443)	189 (171–209)	53 (44–64)	33 (30–37)	24 (22–27)	7 (6–8)	6 (4–9)	17 (15–20)	10 (8–12)
2014–15	1129 (1032–1241)	433 (390–479)	209 (187–233)	25 (18–33)	25 (22–28)	32 (29–36)	6 (5–7)	<1 (0–1)	22 (19–26)	6 (5–8)
2015–16	804 (733–890)	405 (364–452)	206 (184–233)	27 (19–39)	18 (16–21)	15 (13–17)	6 (5–7)	<1 (0–0)	16 (14–19)	3 (2–4)
2016–17	1018 (922–1129)	427 (383–481)	262 (232–295)	15 (10–24)	26 (23–30)	18 (16–21)	6 (5–7)	<1 (0–1)	14 (12–17)	3 (2–4)
slope	0	0.02	–0.04	–0.06	–0.12	–0.08	–0.13	–0.25	–0.04	–0.13

	WAR	SWA	THR	POP	KIN	GUR	SDO	HOK	GSH	STU
1990–91	45 (15–118)	6 (3–11)	87 (62–118)	7 (5–9)	1 (0–2)	5 (4–7)	<1 (0–1)	18 (7–43)	18 (10–31)	2 (1–4)
1991–92	39 (20–75)	6 (3–15)	34 (19–59)	56 (46–67)	7 (4–11)	65 (55–78)	1 (0–3)	3 (1–11)	40 (30–56)	4 (1–17)
1992–93	17 (7–37)	9 (7–13)	12 (6–23)	79 (67–93)	2 (1–4)	27 (20–35)	1 (0–2)	2 (1–3)	11 (7–17)	3 (1–5)
1993–94	23 (14–38)	38 (29–49)	5 (2–11)	21 (17–25)	3 (2–5)	28 (24–34)	3 (2–4)	69 (51–93)	84 (65–107)	11 (6–19)
1994–95	1 (0–4)	52 (39–68)	27 (15–45)	13 (11–16)	1 (0–2)	12 (9–14)	3 (2–5)	101 (54–181)	12 (8–19)	4 (1–11)
1995–96	4 (1–14)	142 (109–186)	18 (7–44)	15 (8–27)	5 (2–11)	27 (19–39)	19 (11–31)	43 (23–76)	26 (16–41)	16 (8–29)
1996–97	40 (23–67)	156 (123–196)	47 (29–76)	12 (9–15)	8 (5–13)	30 (23–38)	19 (14–25)	58 (27–122)	163 (114–234)	11 (6–21)
1997–98	77 (60–99)	127 (105–153)	57 (35–91)	80 (65–99)	16 (11–23)	48 (39–59)	89 (68–117)	79 (39–151)	24 (15–39)	26 (19–35)
1998–99	34 (20–58)	55 (39–77)	37 (23–60)	1 (0–2)	19 (13–28)	6 (4–9)	8 (4–17)	4 (2–11)	2 (0–5)	77 (58–100)
1999–00	343 (282–415)	42 (34–51)	61 (39–94)	<1 (0–1)	2 (1–5)	7 (6–10)	1 (1–3)	4 (2–11)	11 (5–23)	13 (9–20)
2000–01	27 (18–40)	9 (6–13)	43 (26–69)	4 (2–5)	18 (12–26)	22 (18–27)	2 (1–4)	<1 (0–1)	1 (0–1)	9 (6–14)
2001–02	69 (49–94)	17 (12–22)	34 (17–61)	27 (19–39)	13 (6–31)	47 (38–57)	54 (38–74)	6 (2–17)	<1 (0–1)	10 (6–14)
2002–03	35 (23–53)	22 (17–28)	29 (17–49)	36 (29–45)	12 (7–20)	64 (54–75)	72 (60–87)	6 (1–23)	1 (0–2)	6 (3–11)
2003–04	1 (1–3)	2 (1–4)	21 (9–49)	10 (7–14)	15 (8–26)	5 (4–8)	24 (14–41)	16 (7–32)	<1 (0–1)	1 (0–6)
2004–05	11 (6–19)	2 (1–3)	40 (27–59)	7 (6–9)	25 (19–32)	11 (9–13)	43 (34–55)	<1 (0–2)	1 (0–2)	2 (1–5)
2005–06	8 (4–15)	9 (6–13)	6 (3–13)	25 (22–29)	11 (7–15)	17 (14–19)	55 (46–64)	4 (1–9)	<1 (0–1)	8 (4–15)
2006–07	4 (2–7)	10 (7–13)	14 (8–23)	33 (29–37)	26 (21–32)	22 (19–25)	53 (45–61)	1 (0–2)	1 (0–1)	3 (2–5)
2007–08	10 (5–21)	9 (6–12)	21 (13–32)	29 (26–33)	21 (17–27)	16 (13–18)	34 (29–40)	2 (1–4)	1 (0–1)	4 (2–8)
2008–09	21 (13–32)	3 (2–5)	14 (8–22)	17 (14–20)	18 (15–23)	9 (7–10)	35 (30–41)	2 (1–5)	<1 (0–1)	3 (2–5)
2009–10	7 (5–11)	4 (3–6)	14 (9–23)	25 (22–29)	34 (28–41)	24 (21–27)	18 (15–21)	2 (1–4)	1 (0–1)	3 (2–5)
2010–11	8 (5–13)	3 (2–5)	27 (18–40)	15 (12–18)	24 (19–29)	11 (10–13)	5 (4–6)	1 (0–1)	<1 (0–0)	14 (9–20)
2011–12	13 (9–18)	9 (7–12)	11 (7–17)	28 (25–32)	27 (23–32)	15 (14–17)	5 (4–6)	2 (1–3)	<1 (0–1)	7 (5–11)
2012–13	4 (2–6)	7 (5–9)	12 (9–18)	24 (22–27)	30 (26–35)	14 (12–15)	6 (6–8)	1 (0–1)	<1 (0–1)	21 (17–27)
2013–14	11 (7–16)	8 (7–10)	18 (13–25)	17 (15–19)	56 (49–64)	17 (15–19)	6 (5–7)	4 (3–6)	<1 (0–1)	73 (63–86)
2014–15	7 (4–12)	4 (3–5)	18 (13–26)	14 (13–16)	43 (38–49)	14 (12–16)	3 (2–3)	1 (1–2)	<1 (0–0)	24 (19–30)
2015–16	2 (1–4)	4 (3–5)	16 (11–23)	13 (11–14)	79 (70–89)	10 (9–12)	1 (1–2)	1 (0–2)	<1 (0–0)	21 (17–27)
2016–17	5 (2–9)	3 (2–4)	23 (17–32)	14 (12–16)	76 (67–87)	18 (15–20)	1 (1–1)	1 (0–2)	<1 (0–0)	13 (9–17)
slope	–0.07	–0.09	–0.03	0.01	0.13	–0.02	0.03	–0.13	–0.27	0.03

	RBM	SNA	SPE	OPE	SUN	GIZ	MAK	SSK	POS	SKA
1990–91	6 (2–13)	5 (4–7)	9 (6–14)	1 (0–7)	3 (1–11)	9 (6–15)	1 (0–5)	7 (5–10)	3 (1–12)	1 (0–2)
1991–92	6 (3–12)	12 (10–15)	13 (9–18)	<1 (0–3)	6 (2–17)	20 (15–27)	2 (0–8)	29 (23–38)	2 (0–7)	31 (21–45)
1992–93	6 (4–10)	8 (5–13)	18 (12–26)	3 (1–12)	5 (2–14)	5 (3–8)	1 (0–4)	20 (17–25)	3 (1–7)	1 (0–3)
1993–94	4 (2–6)	15 (12–20)	51 (40–64)	26 (10–65)	1 (0–4)	32 (25–41)	3 (1–11)	24 (19–29)	5 (2–12)	6 (3–9)
1994–95	10 (4–29)	1 (0–1)	28 (21–38)	53 (26–104)	14 (8–25)	10 (7–14)	6 (2–12)	3 (2–5)	3 (1–9)	1 (0–2)
1995–96	13 (8–19)	1 (0–3)	60 (42–85)	3 (0–20)	1 (0–6)	13 (8–21)	10 (4–28)	30 (19–44)	6 (2–14)	<1 (0–2)
1996–97	9 (4–24)	1 (1–2)	70 (54–90)	1 (0–15)	3 (1–8)	47 (34–66)	10 (4–26)	1 (0–4)	8 (4–19)	60 (45–87)
1997–98	4 (2–11)	7 (4–11)	76 (59–98)	165 (63–410)	2 (0–9)	48 (35–66)	6 (1–18)	23 (15–35)	29 (18–47)	50 (37–68)
1998–99	2 (1–4)	1 (0–3)	<1 (0–1)	1 (0–10)	9 (4–19)	1 (0–2)	12 (5–26)	17 (9–33)	23 (14–38)	1 (0–2)
1999–00	18 (10–31)	1 (1–2)	<1 (0–1)	1 (0–6)	1 (0–7)	9 (5–16)	5 (2–14)	3 (1–8)	15 (9–27)	<1 (0–1)
2000–01	70 (51–94)	2 (1–4)	<1 (0–0)	<1 (0–2)	1 (0–6)	2 (1–3)	3 (1–10)	1 (0–2)	12 (6–22)	1 (1–3)
2001–02	5 (3–8)	15 (11–21)	<1 (0–1)	<1 (0–3)	4 (0–24)	2 (1–3)	7 (2–24)	<1 (0–4)	11 (5–23)	2 (1–5)
2002–03	16 (10–28)	14 (11–18)	<1 (0–1)	<1 (0–5)	4 (1–28)	1 (0–3)	4 (1–18)	2 (0–5)	7 (2–18)	5 (3–8)
2003–04	6 (4–9)	8 (4–17)	<1 (0–2)	<1 (0–1)	9 (2–46)	<1 (0–1)	9 (2–31)	1 (0–2)	2 (0–12)	<1 (0–4)
2004–05	16 (12–21)	9 (6–11)	<1 (0–1)	<1 (0–1)	8 (3–19)	<1 (0–1)	7 (3–15)	2 (1–3)	1 (0–5)	<1 (0–1)
2005–06	31 (25–39)	7 (5–9)	<1 (0–1)	5 (2–11)	14 (8–22)	<1 (0–1)	6 (3–10)	1 (1–2)	1 (0–4)	<1 (0–2)
2006–07	11 (8–15)	12 (10–15)	<1 (0–1)	1 (0–5)	17 (10–27)	<1 (0–1)	4 (2–9)	1 (0–1)	2 (1–5)	<1 (0–2)
2007–08	6 (4–9)	29 (24–35)	<1 (0–0)	1 (0–3)	30 (19–44)	<1 (0–1)	11 (6–17)	1 (0–1)	2 (1–4)	<1 (0–2)
2008–09	22 (17–28)	11 (9–14)	<1 (0–0)	<1 (0–1)	10 (6–17)	<1 (0–1)	9 (5–15)	<1 (0–1)	2 (1–5)	<1 (0–1)
2009–10	5 (3–6)	29 (25–34)	<1 (0–1)	<1 (0–1)	11 (7–18)	<1 (0–1)	5 (2–9)	1 (0–1)	3 (1–7)	<1 (0–1)
2010–11	10 (8–13)	13 (10–16)	<1 (0–0)	<1 (0–1)	12 (8–20)	<1 (0–1)	6 (3–11)	1 (1–2)	3 (1–6)	<1 (0–1)
2011–12	5 (4–7)	21 (18–24)	<1 (0–0)	<1 (0–2)	12 (8–19)	<1 (0–0)	11 (6–17)	1 (0–1)	1 (1–3)	<1 (0–1)
2012–13	15 (12–19)	25 (21–28)	<1 (0–1)	<1 (0–2)	8 (5–12)	<1 (0–1)	8 (6–12)	1 (0–1)	3 (1–4)	<1 (0–1)
2013–14	65 (57–74)	21 (18–25)	1 (1–1)	1 (0–3)	30 (24–38)	1 (0–1)	14 (11–19)	1 (1–2)	4 (3–7)	<1 (0–1)
2014–15	7 (5–9)	16 (14–19)	<1 (0–0)	<1 (0–1)	12 (8–16)	1 (0–1)	15 (10–21)	<1 (0–1)	9 (6–13)	<1 (0–1)
2015–16	3 (2–5)	24 (21–29)	<1 (0–0)	<1 (0–0)	10 (7–14)	<1 (0–1)	12 (8–18)	<1 (0–1)	3 (2–6)	<1 (0–1)
2016–17	3 (2–5)	21 (18–25)	<1 (0–0)	<1 (0–1)	8 (5–13)	<1 (0–1)	9 (5–14)	<1 (0–1)	2 (1–5)	<1 (0–1)
slope	0.01	0.09	–0.24	–0.15	0.08	–0.23	0.06	–0.18	–0.04	–0.18

	TRE	CAR	LEA	HAP	PIL	RAT	RSO	SWO	BWS	SPO
1990–91	<1 (0–1)	5 (3–9)	2 (1–3)	<1 (0–1)	<1 (0–1)	1 (0–3)	3 (1–6)	1 (0–19)	<1 (0–3)	7 (4–13)
1991–92	13 (8–20)	22 (17–28)	31 (22–44)	8 (6–11)	1 (0–3)	1 (0–2)	11 (8–16)	3 (0–23)	1 (0–4)	19 (15–24)
1992–93	1 (0–2)	32 (26–38)	47 (34–67)	1 (1–2)	<1 (0–4)	<1 (0–3)	3 (2–6)	2 (0–15)	4 (1–8)	1 (1–2)
1993–94	1 (1–2)	6 (4–9)	1 (1–2)	5 (3–8)	<1 (0–1)	21 (16–29)	8 (6–12)	1 (0–22)	3 (1–6)	9 (7–13)
1994–95	1 (0–2)	6 (4–9)	1 (1–2)	8 (5–11)	<1 (0–1)	11 (6–20)	9 (6–13)	4 (1–25)	5 (2–9)	1 (1–2)
1995–96	2 (1–5)	<1 (0–1)	5 (2–10)	<1 (0–1)	<1 (0–3)	3 (1–6)	1 (0–4)	2 (0–25)	3 (1–7)	20 (12–31)
1996–97	1 (0–2)	21 (15–29)	4 (3–7)	7 (4–12)	<1 (0–1)	12 (8–18)	3 (2–6)	8 (1–41)	2 (1–5)	14 (9–21)
1997–98	3 (1–7)	53 (40–70)	20 (13–33)	36 (28–46)	<1 (0–3)	2 (1–6)	8 (4–13)	5 (0–41)	7 (3–16)	3 (1–6)
1998–99	1 (0–6)	<1 (0–1)	<1 (0–1)	4 (2–7)	10 (4–27)	33 (17–62)	9 (4–20)	10 (3–32)	3 (1–11)	1 (0–3)
1999–00	<1 (0–1)	<1 (0–1)	<1 (0–1)	10 (8–13)	2 (1–4)	2 (1–5)	9 (6–14)	1 (0–24)	3 (1–8)	<1 (0–1)
2000–01	1 (0–2)	<1 (0–1)	1 (0–2)	2 (1–4)	1 (0–2)	1 (0–2)	<1 (0–1)	4 (0–21)	1 (0–5)	<1 (0–1)
2001–02	99 (31–324)	<1 (0–2)	<1 (0–3)	11 (8–16)	14 (8–26)	<1 (0–1)	3 (1–5)	2 (0–27)	4 (2–13)	<1 (0–2)
2002–03	<1 (0–1)	<1 (0–1)	16 (11–23)	9 (7–14)	14 (9–22)	<1 (0–1)	5 (3–8)	1 (0–26)	1 (0–5)	<1 (0–2)
2003–04	4 (2–8)	<1 (0–2)	<1 (0–1)	1 (0–6)	6 (2–16)	<1 (0–2)	2 (1–5)	1 (0–25)	1 (0–8)	<1 (0–3)
2004–05	2 (1–3)	<1 (0–0)	<1 (0–1)	2 (1–3)	5 (2–9)	1 (0–4)	1 (0–1)	3 (0–16)	2 (1–5)	<1 (0–2)
2005–06	1 (0–2)	<1 (0–1)	4 (3–5)	4 (3–6)	3 (2–6)	<1 (0–1)	1 (0–2)	2 (0–14)	3 (1–7)	<1 (0–2)
2006–07	1 (0–1)	<1 (0–0)	5 (4–7)	3 (2–4)	7 (5–11)	<1 (0–1)	1 (0–1)	2 (0–10)	1 (0–3)	<1 (0–1)
2007–08	1 (0–1)	<1 (0–1)	1 (1–2)	2 (1–4)	9 (5–13)	<1 (0–1)	1 (1–2)	5 (1–20)	4 (2–8)	<1 (0–0)
2008–09	1 (0–2)	<1 (0–0)	<1 (0–1)	3 (2–4)	3 (2–5)	<1 (0–1)	3 (2–4)	1 (0–12)	3 (1–5)	1 (0–1)
2009–10	1 (1–2)	<1 (0–0)	1 (1–1)	4 (3–6)	3 (2–5)	1 (1–2)	2 (1–3)	3 (0–16)	1 (0–3)	<1 (0–0)
2010–11	<1 (0–1)	<1 (0–0)	1 (1–1)	1 (1–2)	<1 (0–1)	1 (0–1)	1 (0–2)	4 (1–16)	2 (1–4)	<1 (0–1)
2011–12	2 (1–3)	<1 (0–0)	1 (1–1)	2 (2–3)	4 (3–6)	1 (1–2)	1 (0–1)	1 (0–7)	4 (2–5)	<1 (0–0)
2012–13	4 (3–6)	<1 (0–0)	1 (1–1)	3 (2–3)	6 (5–8)	<1 (0–1)	1 (1–1)	2 (0–8)	6 (4–9)	<1 (0–0)
2013–14	2 (1–3)	<1 (0–0)	<1 (0–0)	3 (2–5)	4 (3–5)	1 (1–1)	2 (1–3)	10 (4–20)	8 (5–10)	<1 (0–0)
2014–15	1 (1–1)	<1 (0–0)	<1 (0–1)	2 (1–2)	1 (1–2)	<1 (0–1)	1 (0–1)	8 (3–18)	4 (2–6)	<1 (0–0)
2015–16	2 (1–3)	<1 (0–0)	<1 (0–0)	1 (1–2)	4 (3–6)	<1 (0–0)	1 (0–1)	1 (0–7)	3 (2–5)	<1 (0–0)
2016–17	2 (1–3)	<1 (0–0)	<1 (0–0)	1 (1–2)	8 (6–10)	<1 (0–0)	1 (1–2)	2 (0–9)	1 (0–3)	<1 (0–0)
slope	0.01	–0.2	–0.14	–0.01	0.14	–0.13	–0.07	0.01	0.03	–0.19

	RSK	ATT	LIN	ERA	RHY	ALB	SSI	HPB	NSD	RDO
1990–91	1 (0–2)	3 (2–4)	1 (1–3)	1 (1–2)	<1 (0–1)	<1 (0–2)	1 (0–2)	1 (0–2)	2 (0–8)	<1 (0–1)
1991–92	10 (7–15)	1 (0–2)	6 (4–10)	9 (6–12)	<1 (0–1)	<1 (0–3)	<1 (0–1)	5 (3–8)	30 (21–45)	<1 (0–2)
1992–93	31 (25–37)	1 (0–4)	2 (1–3)	3 (2–4)	<1 (0–0)	<1 (0–3)	<1 (0–0)	4 (2–8)	<1 (0–1)	<1 (0–2)
1993–94	4 (2–7)	<1 (0–1)	12 (9–16)	2 (2–4)	2 (1–4)	<1 (0–1)	2 (2–3)	6 (4–10)	5 (2–13)	<1 (0–2)
1994–95	8 (5–11)	<1 (0–1)	10 (7–14)	4 (3–6)	1 (1–2)	<1 (0–2)	11 (7–16)	6 (3–11)	<1 (0–1)	<1 (0–2)
1995–96	<1 (0–1)	10 (6–17)	4 (2–7)	<1 (0–2)	1 (0–4)	1 (0–4)	3 (1–6)	9 (5–16)	<1 (0–2)	<1 (0–2)
1996–97	<1 (0–2)	10 (5–18)	5 (3–9)	3 (2–5)	1 (0–2)	<1 (0–2)	16 (12–21)	1 (0–3)	<1 (0–1)	5 (1–20)
1997–98	<1 (0–1)	<1 (0–1)	8 (5–12)	4 (2–7)	41 (23–75)	<1 (0–3)	11 (7–17)	1 (0–4)	<1 (0–2)	<1 (0–2)
1998–99	<1 (0–1)	1 (0–3)	1 (0–2)	1 (0–2)	<1 (0–1)	1 (0–3)	<1 (0–1)	<1 (0–3)	<1 (0–1)	4 (1–12)
1999–00	<1 (0–1)	<1 (0–0)	3 (2–5)	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–1)	1 (0–2)	<1 (0–1)	2 (0–8)
2000–01	<1 (0–1)	<1 (0–2)	2 (1–3)	1 (0–2)	<1 (0–1)	1 (0–4)	<1 (0–0)	<1 (0–1)	<1 (0–1)	<1 (0–1)
2001–02	<1 (0–2)	<1 (0–2)	2 (1–4)	1 (0–4)	1 (0–3)	<1 (0–5)	<1 (0–1)	<1 (0–2)	<1 (0–1)	14 (7–28)
2002–03	<1 (0–2)	1 (0–3)	2 (1–3)	1 (0–2)	<1 (0–1)	<1 (0–2)	<1 (0–0)	1 (0–4)	<1 (0–1)	<1 (0–2)
2003–04	<1 (0–1)	1 (0–2)	1 (0–2)	3 (2–6)	3 (1–9)	4 (1–9)	<1 (0–1)	<1 (0–3)	<1 (0–1)	<1 (0–2)
2004–05	1 (0–1)	<1 (0–1)	<1 (0–1)	2 (2–3)	<1 (0–1)	<1 (0–2)	<1 (0–1)	1 (0–3)	<1 (0–1)	<1 (0–0)
2005–06	2 (1–2)	2 (1–3)	<1 (0–1)	2 (2–3)	1 (1–2)	1 (0–3)	1 (1–2)	<1 (0–1)	<1 (0–1)	<1 (0–1)
2006–07	2 (1–3)	1 (0–3)	<1 (0–1)	2 (1–3)	1 (0–2)	1 (0–3)	<1 (0–1)	<1 (0–2)	<1 (0–0)	<1 (0–0)
2007–08	<1 (0–1)	<1 (0–0)	1 (1–2)	2 (2–4)	1 (0–2)	<1 (0–2)	<1 (0–1)	<1 (0–1)	<1 (0–0)	1 (1–3)
2008–09	1 (1–2)	<1 (0–2)	<1 (0–1)	2 (1–2)	<1 (0–0)	1 (0–2)	<1 (0–1)	<1 (0–0)	<1 (0–0)	8 (5–12)
2009–10	1 (1–2)	1 (0–2)	1 (0–1)	2 (1–2)	1 (0–2)	<1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–1)
2010–11	1 (0–1)	7 (4–11)	<1 (0–1)	1 (1–2)	<1 (0–1)	3 (1–5)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)
2011–12	2 (1–2)	4 (3–6)	1 (0–1)	2 (2–3)	<1 (0–1)	1 (1–2)	1 (0–1)	1 (0–1)	<1 (0–1)	1 (0–1)
2012–13	3 (2–4)	4 (3–6)	<1 (0–1)	2 (2–3)	<1 (0–0)	7 (5–9)	1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–1)
2013–14	3 (2–4)	4 (3–5)	<1 (0–0)	2 (2–3)	<1 (0–0)	17 (14–21)	1 (1–1)	<1 (0–1)	<1 (0–0)	<1 (0–1)
2014–15	2 (1–2)	3 (2–4)	<1 (0–1)	2 (1–2)	<1 (0–1)	6 (5–9)	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–1)
2015–16	1 (1–1)	2 (2–4)	<1 (0–0)	2 (2–3)	<1 (0–0)	2 (1–4)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–1)
2016–17	1 (1–2)	10 (8–14)	<1 (0–0)	2 (1–2)	<1 (0–0)	2 (1–4)	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–1)
slope	0.01	0.07	–0.17	0.01	–0.06	0.15	–0.08	–0.15	–0.09	–0.01

Orange roughy trawl fishery

- Of the 557 bycatch species examined, 94 showed a decrease in catch over time and 29 were significant; 62 showed an increase and 14 were significant
- Species showing the greatest decline were dark ghost shark (GSH), black oreo (*Allocyttus niger*, BOE), and lanternshark (*Etmopterus* sp., ETM) (Figure 11)
- Species showing the greatest increase were longnose velvet dogfish (*Centroscymnus crepidater*, CYP), Portuguese dogfish (*Centroscymnus coelolepis*, CYL), and Owston's dogfish (*Centroscymnus owstonii*, CYO) (Figure 11)
- Most common bycatch species by weight (t) were smooth oreo (*Pseudocottus maculatus*, SSO), black oreo (BOE), and unspecified sharks (SHA) (Figure 12).

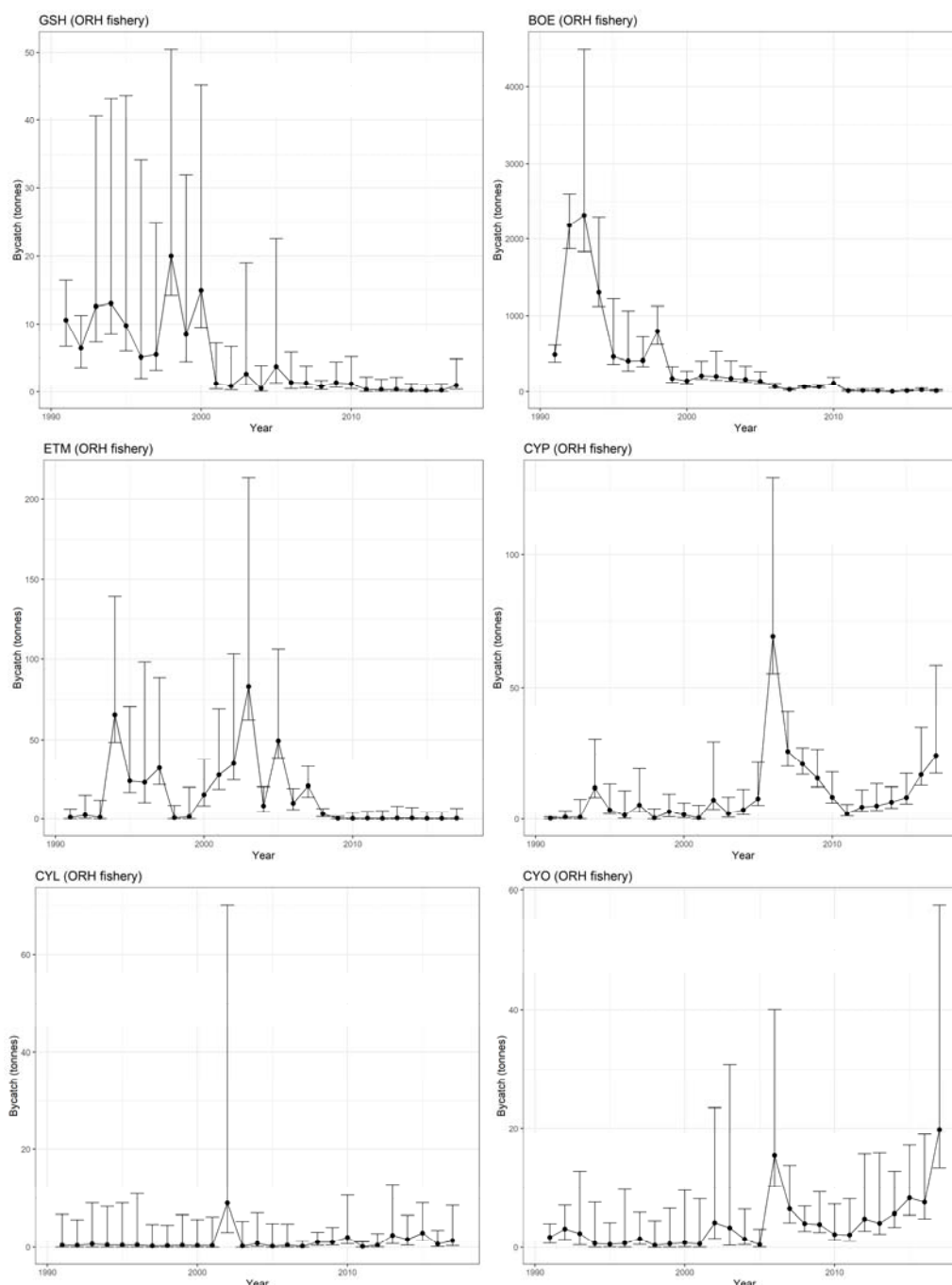


Figure 11: Annual bycatch estimates in the orange roughy trawl fishery for the species showing the greatest increases and declines between 1990–91 and 2016–17. See text above for explanation of the species codes.

Note: the scale changes on the y-axis between plots.

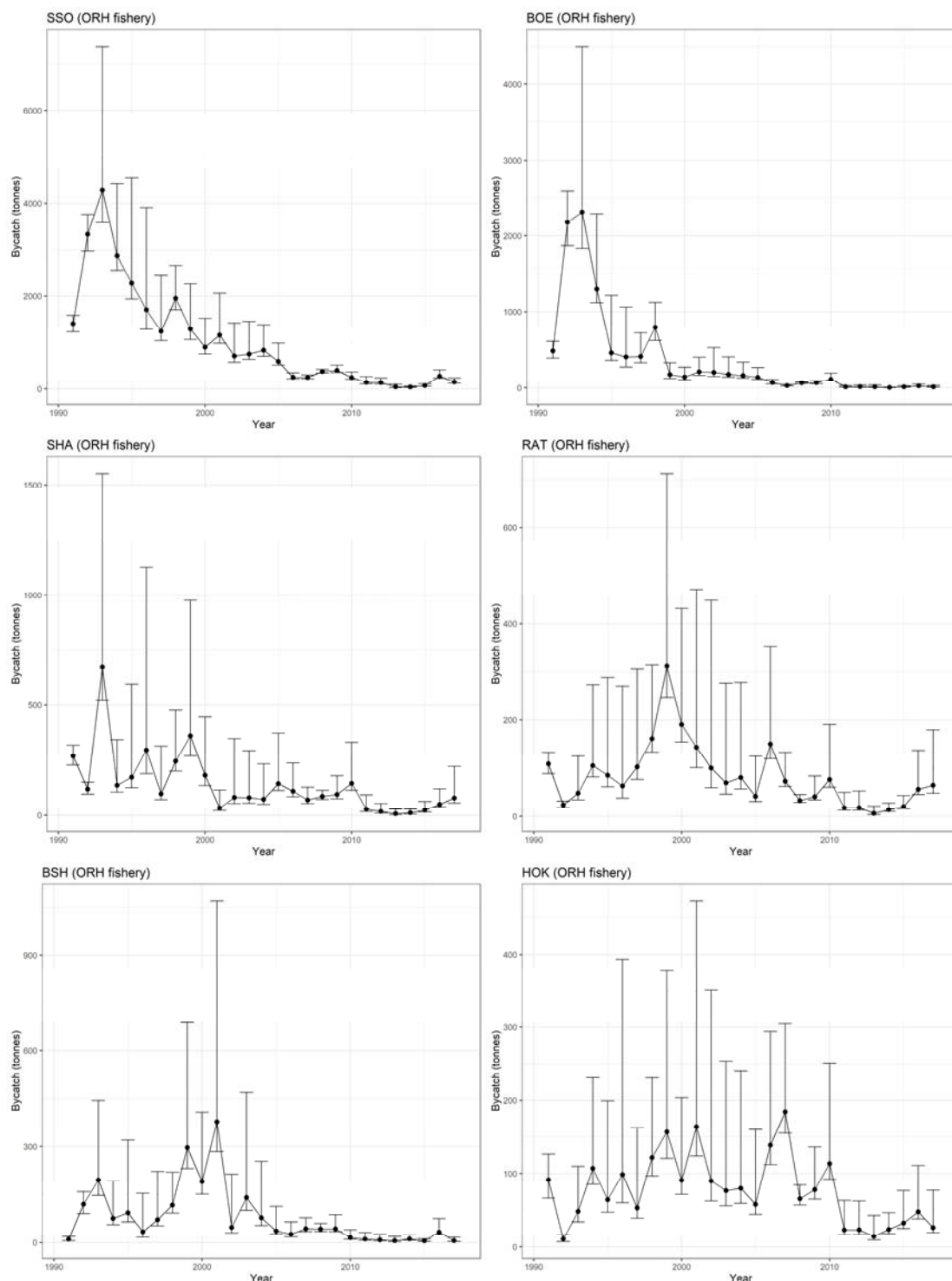


Figure 12: Annual bycatch estimates for the most common orange roughy trawl fishery bycatch species by weight between 1990–91 and 2016–17. See <http://marlin.niwa.co.nz> or Table 10 for species code definitions. Note: the scale changes on the y-axis between plots. SSO, BOE, SHA, RAT, and BSH all had significant decreasing trends, while HOK had a non-significant decreasing trend.

Table 5: Orange roughy trawl fishery. Total annual bycatch estimates (t) (with estimated 95% CIs) and slope of the regression for the top 50 individual species in this fishery (see <http://marlin.niwa.co.nz> for species code definitions). Species are ordered by decreasing total catch.

	SSO	BOE	SHA	RAT	BSH	HOK	RIB	SLK	SND	ETB
1990–91	1402 (1226–1582)	486 (390–611)	267 (227–318)	108 (88–132)	10 (6–19)	91 (66–127)	234 (181–299)	1 (0–4)	62 (42–89)	19 (10–32)
1991–92	3328 (2975–3756)	2177 (1872–2590)	119 (96–150)	24 (18–32)	119 (90–158)	11 (7–17)	54 (42–71)	2 (0–15)	3 (1–7)	55 (37–82)
1992–93	4282 (3579–7383)	2313 (1835–4496)	672 (524–1552)	48 (34–124)	194 (147–444)	48 (34–110)	43 (31–101)	3 (1–10)	28 (19–55)	3 (0–34)
1993–94	2875 (2562–4422)	1298 (1119–2291)	136 (105–342)	105 (82–274)	75 (56–191)	107 (85–231)	41 (30–102)	65 (48–177)	22 (16–43)	30 (18–118)
1994–95	2277 (1937–4549)	459 (361–1216)	172 (125–596)	85 (61–289)	93 (65–320)	64 (47–199)	63 (44–230)	37 (25–138)	26 (19–61)	40 (24–219)
1995–96	1703 (1279–3906)	406 (275–1061)	295 (188–1126)	63 (38–271)	34 (17–153)	99 (60–394)	25 (15–108)	33 (17–166)	10 (5–32)	3 (0–48)
1996–97	1234 (1034–2443)	411 (331–720)	98 (71–313)	102 (76–306)	72 (53–222)	53 (39–163)	32 (23–100)	67 (46–232)	18 (13–41)	56 (33–277)
1997–98	1951 (1702–2666)	794 (619–1123)	245 (199–476)	161 (133–314)	117 (92–220)	122 (97–230)	66 (52–128)	46 (33–102)	28 (19–46)	19 (12–58)
1998–99	1282 (1056–2262)	177 (124–331)	360 (268–977)	311 (248–712)	297 (231–688)	157 (121–378)	64 (49–136)	106 (77–266)	131 (97–235)	7 (4–32)
1999–00	895 (752–1517)	145 (107–272)	180 (134–447)	190 (154–432)	190 (151–408)	90 (71–204)	40 (32–89)	112 (85–268)	35 (26–60)	1 (0–18)
2000–01	1153 (977–2059)	213 (166–404)	33 (22–115)	143 (100–471)	378 (284–1069)	164 (124–473)	66 (44–225)	133 (94–402)	49 (36–108)	1 (0–19)
2001–02	705 (574–1415)	207 (152–527)	81 (53–347)	100 (59–449)	48 (30–213)	90 (62–351)	54 (34–251)	67 (42–277)	55 (39–170)	53 (31–305)
2002–03	749 (634–1449)	179 (143–407)	81 (55–292)	69 (46–277)	140 (100–468)	76 (56–254)	46 (30–199)	26 (17–96)	82 (64–212)	1 (0–20)
2003–04	829 (704–1375)	165 (130–339)	73 (51–232)	80 (57–278)	78 (54–253)	80 (59–240)	26 (17–97)	47 (33–142)	59 (45–137)	127 (90–428)
2004–05	590 (513–982)	141 (113–266)	143 (113–373)	41 (31–124)	37 (26–113)	58 (44–160)	44 (32–143)	36 (27–97)	53 (42–113)	20 (12–88)
2005–06	253 (220–350)	70 (52–112)	109 (85–236)	150 (119–353)	26 (18–64)	139 (112–294)	54 (41–135)	73 (58–147)	139 (112–239)	44 (33–119)
2006–07	251 (218–306)	30 (23–41)	70 (53–128)	73 (62–132)	43 (34–78)	184 (155–305)	45 (37–86)	40 (33–66)	111 (94–153)	48 (39–89)
2007–08	375 (341–424)	66 (57–80)	86 (72–114)	33 (29–45)	43 (35–60)	66 (57–84)	17 (14–27)	29 (25–38)	63 (53–78)	58 (50–79)
2008–09	400 (357–515)	67 (55–95)	95 (75–179)	41 (34–84)	43 (34–87)	78 (65–136)	16 (12–36)	45 (37–83)	34 (28–52)	66 (54–132)
2009–10	245 (212–366)	114 (92–193)	144 (114–330)	76 (60–191)	15 (10–40)	113 (92–251)	14 (10–41)	96 (76–207)	55 (44–100)	48 (37–129)
2010–11	140 (110–268)	12 (8–28)	28 (17–92)	18 (13–50)	11 (7–32)	23 (17–63)	19 (14–65)	15 (10–41)	16 (12–34)	31 (21–100)
2011–12	137 (101–234)	16 (9–36)	17 (10–54)	18 (13–53)	8 (5–26)	23 (17–62)	14 (10–42)	35 (24–93)	23 (18–46)	27 (19–85)
2012–13	43 (27–97)	12 (6–38)	7 (3–29)	6 (3–21)	6 (3–19)	14 (9–43)	15 (10–51)	10 (5–36)	10 (7–21)	24 (15–84)
2013–14	41 (31–59)	4 (3–8)	11 (6–29)	14 (10–28)	11 (7–23)	24 (18–46)	48 (34–102)	5 (3–14)	40 (30–63)	18 (13–40)
2014–15	72 (58–108)	12 (8–26)	23 (15–63)	20 (16–43)	5 (3–12)	33 (25–76)	48 (38–96)	9 (6–23)	21 (17–37)	34 (25–92)
2015–16	275 (235–412)	26 (20–49)	50 (38–120)	56 (45–136)	32 (25–75)	48 (38–111)	51 (40–124)	69 (55–154)	58 (48–103)	64 (50–167)
2016–17	152 (124–236)	14 (9–31)	78 (57–220)	64 (48–179)	6 (3–17)	27 (20–77)	67 (50–185)	94 (69–249)	45 (36–89)	46 (33–149)
slope	–0.15	–0.2	–0.1	–0.06	–0.1	–0.03	–0.03	0.04	0.02	0.06

	BEE	SOR	MOD	HJO	CDL	HAK	JAV	WSQ	LCH	ETM
1990–91	58 (46–72)	65 (37–115)	<1 (0–2)	30 (21–42)	8 (5–13)	98 (79–123)	10 (5–19)	1 (1–3)	20 (15–28)	1 (0–6)
1991–92	16 (12–22)	6 (2–13)	1 (0–10)	4 (2–7)	15 (10–22)	2 (1–5)	1 (0–3)	2 (1–4)	2 (1–7)	2 (0–15)
1992–93	9 (6–24)	72 (50–133)	1 (0–15)	18 (8–46)	46 (29–125)	3 (1–13)	6 (3–19)	3 (1–9)	6 (3–16)	1 (0–12)
1993–94	37 (29–90)	82 (63–161)	12 (7–25)	29 (20–61)	34 (24–89)	16 (12–35)	21 (12–62)	11 (8–26)	12 (8–27)	65 (48–139)
1994–95	73 (56–233)	74 (57–185)	15 (10–37)	30 (20–77)	30 (19–106)	3 (2–11)	4 (2–18)	14 (10–45)	6 (3–16)	24 (17–70)
1995–96	24 (14–108)	13 (8–42)	5 (1–28)	7 (3–28)	34 (19–146)	10 (5–42)	119 (51–648)	11 (6–49)	8 (3–33)	23 (10–98)
1996–97	18 (13–61)	15 (11–36)	27 (20–65)	1 (0–2)	51 (35–152)	12 (9–39)	3 (1–11)	26 (19–77)	11 (8–31)	32 (22–88)
1997–98	24 (19–44)	29 (21–45)	7 (5–12)	16 (11–28)	28 (19–53)	37 (28–74)	56 (41–118)	15 (10–28)	32 (24–55)	1 (0–9)
1998–99	49 (35–123)	53 (41–98)	14 (9–28)	1 (0–3)	33 (23–75)	23 (17–54)	68 (49–180)	38 (28–89)	12 (7–27)	1 (0–20)
1999–00	25 (19–60)	39 (31–70)	29 (19–52)	24 (16–46)	61 (48–132)	59 (43–133)	31 (20–87)	28 (20–65)	51 (37–97)	15 (8–38)
2000–01	20 (15–62)	23 (15–61)	31 (22–71)	1 (0–9)	36 (21–132)	108 (78–314)	36 (23–130)	41 (31–110)	28 (19–73)	28 (19–69)
2001–02	12 (7–49)	15 (10–67)	6 (3–18)	14 (9–45)	26 (17–118)	36 (23–155)	67 (40–310)	16 (11–59)	29 (19–96)	35 (25–103)
2002–03	28 (21–90)	16 (10–60)	9 (7–24)	13 (9–37)	33 (23–118)	20 (13–77)	19 (12–84)	18 (14–56)	25 (17–71)	83 (62–214)
2003–04	47 (36–131)	21 (14–72)	43 (32–95)	13 (8–33)	20 (13–69)	22 (14–80)	5 (3–19)	25 (18–66)	21 (14–54)	8 (4–20)
2004–05	43 (35–110)	24 (17–67)	56 (46–114)	12 (9–29)	31 (22–100)	8 (5–23)	17 (12–59)	46 (37–113)	11 (8–27)	49 (39–107)
2005–06	41 (34–81)	7 (5–16)	34 (25–63)	97 (79–161)	12 (9–30)	12 (9–28)	15 (10–37)	72 (58–138)	53 (42–93)	10 (6–19)
2006–07	38 (32–59)	11 (8–21)	136 (115–186)	7 (5–12)	11 (8–20)	12 (8–22)	14 (11–27)	50 (42–78)	21 (16–32)	21 (14–33)
2007–08	21 (18–26)	8 (6–11)	13 (10–16)	41 (34–52)	10 (8–14)	5 (3–8)	5 (4–8)	16 (13–20)	27 (22–35)	3 (1–7)
2008–09	24 (20–41)	11 (9–21)	39 (31–59)	20 (16–33)	12 (9–23)	5 (4–12)	5 (4–11)	30 (25–50)	20 (15–33)	<1 (0–2)
2009–10	27 (22–58)	7 (5–16)	109 (84–191)	29 (23–51)	7 (5–18)	6 (4–18)	5 (3–15)	20 (16–42)	38 (29–74)	<1 (0–4)
2010–11	5 (4–14)	9 (6–20)	8 (5–17)	7 (5–15)	12 (8–30)	2 (1–8)	3 (2–8)	3 (2–9)	5 (3–12)	<1 (0–5)
2011–12	10 (7–27)	7 (5–17)	14 (10–31)	12 (9–24)	4 (3–10)	2 (1–6)	3 (2–10)	4 (2–10)	6 (4–13)	<1 (0–5)
2012–13	4 (2–12)	10 (7–26)	3 (1–10)	12 (8–23)	7 (4–21)	3 (2–13)	1 (0–3)	5 (3–16)	2 (1–6)	1 (0–8)
2013–14	8 (5–14)	10 (7–20)	9 (5–19)	13 (10–20)	10 (7–19)	11 (7–24)	4 (3–8)	5 (3–9)	2 (1–4)	<1 (0–7)
2014–15	5 (3–11)	10 (8–20)	2 (1–5)	12 (10–22)	9 (6–22)	12 (9–23)	2 (1–6)	6 (4–14)	5 (3–10)	<1 (0–4)
2015–16	17 (14–36)	15 (11–34)	16 (13–31)	52 (44–87)	5 (3–14)	7 (5–17)	10 (7–27)	10 (8–22)	13 (10–26)	<1 (0–4)
2016–17	18 (14–47)	18 (13–49)	2 (1–6)	81 (65–161)	3 (2–11)	43 (31–110)	8 (5–26)	16 (12–41)	24 (18–52)	<1 (0–7)
slope	–0.05	–0.06	0.06	0.04	–0.07	–0.03	–0.05	0.02	–0.01	–0.19

	SPD	CYP	BYS	PLS	ETL	COU	BSL	CSQ	WHX	GSP
1990–91	<1 (0–13)	<1 (0–1)	1 (0–7)	2 (0–8)	15 (9–27)	<1 (0–5)	2 (1–8)	1 (0–12)	1 (0–21)	5 (2–9)
1991–92	32 (12–129)	1 (0–3)	1 (0–9)	10 (4–22)	2 (0–7)	<1 (0–5)	1 (0–5)	1 (0–5)	1 (0–13)	<1 (0–2)
1992–93	20 (5–109)	1 (0–8)	1 (0–5)	2 (0–20)	<1 (0–7)	1 (0–9)	1 (0–11)	1 (0–17)	2 (0–18)	3 (1–15)
1993–94	211 (120–716)	12 (8–31)	66 (35–134)	58 (39–161)	141 (89–483)	<1 (0–5)	55 (31–176)	12 (6–39)	1 (0–13)	7 (3–27)
1994–95	1 (0–16)	3 (2–13)	11 (6–26)	13 (7–54)	2 (1–12)	<1 (0–6)	1 (0–6)	22 (12–101)	1 (0–9)	2 (1–11)
1995–96	3 (0–34)	1 (0–11)	2 (0–8)	9 (2–60)	1 (0–10)	1 (0–9)	2 (0–14)	7 (1–59)	16 (7–78)	1 (0–10)
1996–97	2 (0–18)	5 (3–19)	5 (1–17)	9 (5–36)	1 (0–3)	2 (1–11)	1 (0–6)	4 (2–14)	<1 (0–5)	<1 (0–3)
1997–98	<1 (0–6)	<1 (0–4)	3 (1–8)	1 (0–7)	25 (14–71)	12 (4–40)	8 (4–24)	1 (0–7)	8 (3–21)	<1 (0–4)
1998–99	1 (0–10)	3 (1–10)	36 (9–131)	6 (2–24)	8 (3–40)	31 (19–80)	39 (24–126)	1 (0–11)	1 (0–10)	2 (1–8)
1999–00	3 (0–22)	2 (1–6)	13 (8–25)	2 (0–7)	4 (2–18)	14 (5–41)	32 (16–114)	2 (0–9)	6 (2–21)	14 (9–44)
2000–01	2 (0–17)	<1 (0–5)	51 (25–136)	1 (0–7)	<1 (0–5)	70 (22–366)	1 (0–8)	1 (0–10)	1 (0–15)	20 (11–80)
2001–02	<1 (0–9)	7 (4–30)	1 (0–5)	1 (0–13)	1 (0–14)	7 (3–40)	11 (2–109)	1 (0–5)	1 (0–12)	5 (3–37)
2002–03	1 (0–8)	2 (1–8)	10 (5–29)	1 (0–9)	2 (1–12)	29 (16–136)	14 (5–113)	1 (0–9)	35 (14–202)	9 (5–46)
2003–04	<1 (0–3)	4 (2–11)	16 (9–40)	12 (5–60)	4 (2–21)	7 (3–31)	<1 (0–10)	1 (0–9)	1 (0–10)	4 (2–20)
2004–05	<1 (0–4)	8 (5–22)	5 (3–13)	3 (2–12)	<1 (0–3)	12 (7–44)	1 (0–5)	3 (1–10)	8 (4–27)	7 (5–31)
2005–06	<1 (0–3)	69 (55–130)	1 (0–1)	6 (3–21)	<1 (0–1)	4 (2–12)	<1 (0–4)	16 (10–46)	1 (0–8)	4 (3–12)
2006–07	1 (0–8)	26 (20–41)	2 (1–4)	1 (0–4)	<1 (0–1)	1 (0–2)	1 (0–4)	15 (10–35)	28 (15–65)	7 (5–14)
2007–08	<1 (0–1)	21 (17–27)	3 (1–4)	9 (6–15)	<1 (0–1)	<1 (0–0)	<1 (0–1)	1 (1–2)	<1 (0–2)	6 (5–10)
2008–09	<1 (0–1)	16 (12–27)	1 (0–2)	15 (10–37)	<1 (0–2)	<1 (0–0)	1 (0–3)	6 (4–17)	1 (0–3)	6 (5–15)
2009–10	<1 (0–2)	8 (6–18)	1 (0–3)	7 (4–23)	1 (0–3)	<1 (0–1)	1 (0–3)	5 (3–18)	<1 (0–2)	12 (8–35)
2010–11	<1 (0–4)	2 (1–6)	1 (1–3)	2 (1–9)	<1 (0–3)	1 (0–2)	<1 (0–1)	9 (5–31)	1 (0–2)	3 (2–10)
2011–12	<1 (0–3)	5 (3–11)	<1 (0–1)	6 (3–22)	<1 (0–2)	1 (0–3)	1 (0–4)	9 (6–32)	2 (1–7)	2 (1–7)
2012–13	<1 (0–4)	5 (3–14)	<1 (0–2)	7 (4–27)	<1 (0–1)	<1 (0–3)	2 (1–10)	11 (6–38)	4 (3–13)	1 (1–6)
2013–14	<1 (0–4)	7 (4–12)	<1 (0–1)	6 (3–16)	<1 (0–1)	<1 (0–1)	1 (0–4)	13 (8–30)	3 (1–7)	2 (1–6)
2014–15	<1 (0–2)	8 (6–18)	<1 (0–0)	9 (5–22)	<1 (0–2)	<1 (0–1)	1 (0–3)	17 (12–35)	4 (2–9)	5 (3–13)
2015–16	<1 (0–2)	17 (13–35)	<1 (0–1)	7 (4–21)	<1 (0–1)	<1 (0–1)	2 (1–7)	11 (7–28)	14 (9–32)	3 (2–9)
2016–17	<1 (0–3)	24 (18–58)	<1 (0–1)	17 (10–60)	2 (1–8)	<1 (0–2)	12 (7–56)	15 (10–45)	40 (27–100)	30 (21–105)
slope	–0.18	0.12	–0.16	0.02	–0.16	–0.07	–0.05	0.08	0.05	0.07

	BYX	GSH	OEO	CYO	BNS	SNR	ASR	SOP	DWE	CHI
1990–91	1 (0–4)	11 (7–16)	37 (13–115)	2 (1–4)	1 (0–15)	1 (0–8)	<1 (0–1)	3 (0–103)	<1 (0–5)	<1 (0–4)
1991–92	4 (1–15)	6 (4–11)	19 (5–76)	3 (1–7)	2 (0–22)	1 (0–8)	<1 (0–1)	4 (0–129)	<1 (0–4)	1 (0–3)
1992–93	19 (8–51)	13 (7–41)	9 (1–90)	2 (0–13)	9 (2–41)	1 (0–12)	<1 (0–1)	5 (0–185)	1 (0–7)	1 (0–8)
1993–94	11 (4–31)	13 (8–43)	1 (0–16)	1 (0–8)	10 (4–35)	1 (0–9)	<1 (0–2)	6 (0–186)	45 (26–145)	1 (0–6)
1994–95	8 (4–22)	10 (6–44)	1 (0–16)	1 (0–4)	7 (2–33)	3 (1–19)	<1 (0–1)	16 (0–279)	1 (0–10)	<1 (0–3)
1995–96	2 (0–13)	5 (2–34)	6 (1–38)	1 (0–10)	2 (0–16)	1 (0–15)	<1 (0–2)	4 (0–212)	<1 (0–9)	3 (1–19)
1996–97	1 (1–4)	5 (3–25)	1 (0–5)	1 (1–6)	9 (3–44)	1 (0–7)	<1 (0–1)	8 (0–149)	16 (6–85)	29 (16–109)
1997–98	67 (30–148)	20 (14–50)	5 (1–20)	<1 (0–5)	15 (6–48)	<1 (0–6)	4 (2–12)	4 (0–148)	<1 (0–4)	<1 (0–2)
1998–99	4 (1–13)	8 (4–32)	<1 (0–4)	1 (0–7)	3 (1–10)	7 (3–27)	19 (12–53)	5 (0–225)	2 (0–14)	18 (10–48)
1999–00	4 (2–11)	15 (9–45)	1 (0–9)	1 (0–10)	6 (3–21)	14 (5–53)	58 (29–169)	4 (0–149)	3 (1–9)	4 (2–13)
2000–01	<1 (0–2)	1 (0–7)	1 (0–11)	1 (0–8)	3 (1–19)	1 (0–6)	1 (0–3)	2 (0–121)	1 (0–4)	1 (0–7)
2001–02	<1 (0–3)	1 (0–7)	<1 (0–10)	4 (2–23)	4 (1–31)	14 (5–103)	<1 (0–2)	3 (0–122)	15 (6–104)	2 (1–15)
2002–03	1 (0–7)	3 (1–19)	<1 (0–3)	3 (0–31)	4 (1–27)	41 (15–274)	2 (1–9)	7 (0–156)	<1 (0–4)	4 (2–20)
2003–04	1 (0–8)	1 (0–4)	1 (0–9)	1 (0–6)	9 (3–59)	10 (4–58)	<1 (0–2)	2 (0–120)	2 (0–26)	1 (1–6)
2004–05	<1 (0–2)	4 (1–22)	<1 (0–7)	<1 (0–3)	7 (2–37)	5 (2–26)	<1 (0–1)	2 (0–89)	1 (0–7)	3 (2–13)
2005–06	2 (0–21)	1 (0–6)	1 (0–5)	15 (10–40)	1 (0–8)	<1 (0–3)	1 (0–1)	8 (0–139)	1 (0–5)	3 (2–10)
2006–07	1 (0–2)	1 (1–4)	<1 (0–4)	6 (4–14)	1 (0–4)	<1 (0–3)	<1 (0–1)	1 (0–64)	3 (1–10)	1 (0–3)
2007–08	<1 (0–0)	1 (0–2)	<1 (0–3)	4 (3–7)	2 (1–5)	<1 (0–2)	<1 (0–0)	2 (0–50)	1 (0–2)	1 (1–2)
2008–09	<1 (0–1)	1 (1–4)	6 (1–30)	4 (3–9)	1 (0–4)	<1 (0–2)	<1 (0–0)	3 (0–65)	<1 (0–2)	1 (0–2)
2009–10	<1 (0–2)	1 (0–5)	23 (5–109)	2 (1–7)	1 (0–4)	1 (0–4)	2 (1–4)	4 (0–50)	<1 (0–0)	2 (1–6)
2010–11	<1 (0–2)	<1 (0–2)	<1 (0–4)	2 (1–8)	1 (0–2)	1 (0–8)	<1 (0–1)	<1 (0–44)	<1 (0–3)	1 (0–4)
2011–12	1 (0–3)	<1 (0–2)	<1 (0–4)	5 (3–16)	<1 (0–2)	<1 (0–2)	<1 (0–0)	<1 (0–41)	<1 (0–0)	2 (1–9)
2012–13	<1 (0–4)	<1 (0–2)	<1 (0–6)	4 (2–16)	1 (0–8)	<1 (0–3)	<1 (0–0)	<1 (0–57)	<1 (0–1)	1 (0–5)
2013–14	1 (0–3)	<1 (0–1)	<1 (0–5)	6 (3–13)	1 (0–10)	<1 (0–4)	<1 (0–1)	<1 (0–50)	<1 (0–2)	1 (0–3)
2014–15	<1 (0–1)	<1 (0–1)	1 (0–3)	8 (5–17)	1 (0–4)	<1 (0–4)	<1 (0–0)	<1 (0–45)	1 (0–4)	<1 (0–1)
2015–16	3 (1–10)	<1 (0–1)	<1 (0–2)	8 (5–19)	1 (0–5)	<1 (0–3)	3 (2–7)	1 (0–59)	<1 (0–1)	2 (1–6)
2016–17	<1 (0–1)	1 (0–5)	<1 (0–2)	20 (13–58)	1 (0–4)	<1 (0–3)	6 (4–16)	1 (0–60)	1 (0–4)	2 (0–7)
slope	–0.15	–0.2	–0.15	0.09	–0.09	–0.12	0.02	–0.14	–0.07	0.01

	SBI	RCH	SMC	SPE	LIN	WHR	VCO	SQU	SKA	WOE
1990–91	27 (18–40)	<1 (0–6)	<1 (0–2)	3 (1–7)	3 (1–10)	18 (8–48)	<1 (0–2)	<1 (0–1)	1 (0–3)	<1 (0–1)
1991–92	<1 (0–1)	<1 (0–4)	<1 (0–2)	<1 (0–2)	3 (0–18)	<1 (0–3)	<1 (0–3)	2 (1–4)	<1 (0–2)	2 (0–11)
1992–93	<1 (0–2)	<1 (0–7)	4 (1–17)	7 (3–21)	1 (0–9)	<1 (0–5)	<1 (0–4)	<1 (0–4)	1 (0–5)	3 (1–10)
1993–94	1 (0–5)	2 (1–9)	1 (0–3)	7 (4–20)	5 (3–21)	9 (2–58)	<1 (0–3)	7 (4–23)	<1 (0–3)	2 (1–8)
1994–95	<1 (0–1)	1 (0–6)	11 (6–45)	<1 (0–2)	<1 (0–4)	1 (0–10)	2 (1–8)	5 (2–25)	1 (0–3)	4 (2–23)
1995–96	6 (1–49)	3 (1–16)	<1 (0–3)	<1 (0–4)	1 (0–6)	2 (0–20)	2 (1–12)	2 (1–16)	<1 (0–2)	<1 (0–4)
1996–97	<1 (0–1)	<1 (0–2)	<1 (0–1)	4 (2–13)	1 (0–5)	<1 (0–3)	5 (2–20)	1 (1–6)	4 (2–18)	4 (2–17)
1997–98	<1 (0–2)	2 (0–7)	<1 (0–2)	1 (1–4)	2 (1–10)	<1 (0–3)	5 (2–12)	7 (4–18)	3 (2–8)	<1 (0–2)
1998–99	2 (1–10)	<1 (0–4)	<1 (0–4)	17 (11–42)	3 (1–15)	<1 (0–4)	<1 (0–4)	1 (0–3)	17 (10–49)	<1 (0–1)
1999–00	<1 (0–2)	1 (0–4)	<1 (0–2)	1 (0–2)	1 (0–8)	1 (0–8)	1 (0–4)	3 (2–10)	3 (1–9)	<1 (0–2)
2000–01	<1 (0–3)	<1 (0–5)	34 (17–137)	3 (1–12)	8 (2–52)	<1 (0–5)	<1 (0–3)	2 (1–12)	1 (0–6)	3 (1–13)
2001–02	<1 (0–2)	1 (0–6)	<1 (0–2)	<1 (0–2)	2 (1–14)	<1 (0–3)	<1 (0–3)	1 (0–6)	1 (0–5)	<1 (0–2)
2002–03	<1 (0–1)	<1 (0–4)	<1 (0–1)	1 (0–4)	5 (2–34)	<1 (0–3)	<1 (0–1)	1 (0–8)	4 (2–25)	2 (1–8)
2003–04	4 (1–19)	<1 (0–3)	<1 (0–2)	<1 (0–3)	2 (1–15)	9 (4–53)	2 (1–6)	1 (0–5)	<1 (0–1)	1 (1–6)
2004–05	<1 (0–2)	2 (1–8)	<1 (0–1)	1 (0–4)	2 (1–11)	1 (0–4)	<1 (0–2)	1 (0–3)	<1 (0–1)	<1 (0–1)
2005–06	<1 (0–2)	<1 (0–1)	<1 (0–0)	1 (0–3)	2 (1–10)	<1 (0–2)	2 (1–5)	<1 (0–2)	<1 (0–1)	1 (0–2)
2006–07	<1 (0–1)	3 (2–8)	<1 (0–0)	1 (0–2)	2 (1–6)	<1 (0–1)	2 (1–5)	1 (0–2)	<1 (0–1)	3 (2–6)
2007–08	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–1)	<1 (0–1)	7 (5–10)	<1 (0–1)	<1 (0–1)	1 (1–2)
2008–09	<1 (0–1)	<1 (0–2)	<1 (0–1)	<1 (0–1)	1 (0–3)	3 (1–17)	8 (6–15)	<1 (0–1)	<1 (0–0)	2 (1–4)
2009–10	<1 (0–1)	1 (0–3)	<1 (0–2)	1 (0–3)	<1 (0–2)	<1 (0–1)	2 (1–5)	<1 (0–1)	<1 (0–1)	2 (1–7)
2010–11	<1 (0–0)	<1 (0–1)	<1 (0–2)	1 (0–2)	<1 (0–2)	<1 (0–1)	1 (0–3)	<1 (0–1)	<1 (0–1)	1 (0–4)
2011–12	<1 (0–1)	1 (0–3)	<1 (0–2)	<1 (0–1)	1 (0–5)	<1 (0–2)	<1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–2)
2012–13	1 (0–5)	1 (0–3)	<1 (0–3)	<1 (0–1)	<1 (0–3)	<1 (0–0)	<1 (0–2)	<1 (0–1)	<1 (0–1)	1 (0–4)
2013–14	1 (1–4)	1 (1–4)	1 (1–3)	1 (0–2)	1 (0–3)	<1 (0–2)	<1 (0–2)	<1 (0–1)	<1 (0–1)	<1 (0–0)
2014–15	1 (0–2)	3 (2–6)	1 (1–4)	1 (1–2)	1 (0–2)	3 (2–10)	<1 (0–2)	1 (0–2)	<1 (0–1)	1 (0–3)
2015–16	1 (0–4)	11 (7–28)	<1 (0–2)	1 (0–3)	1 (0–3)	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–2)
2016–17	25 (12–83)	23 (16–70)	<1 (0–1)	<1 (0–1)	1 (0–4)	<1 (0–1)	<1 (0–1)	1 (1–7)	<1 (0–1)	3 (1–15)
slope	0.02	0.09	–0.05	–0.06	–0.06	–0.07	–0.01	–0.1	–0.11	–0.01

Oreo trawl fishery

- Of the 228 bycatch species examined, 40 showed a decrease in catch over time and seven were significant; 44 showed an increase and nine were significant
- Species showing the greatest decline were dark ghost shark (GSH), unspecified shark (SHA), and lanternshark (ETM) (Figure 13)
- Species showing the greatest increase were longnose velvet dogfish (CYP), ridge scaled rattail (*Macrourus carinatus*, MCA), and Baxter's dogfish (*Etmopterus granulosus*, ETB) (Figure 13)
- Most common bycatch species by weight (t) were orange roughy (ORH), unspecified sharks (SHA), and Baxter's dogfish (ETB) (Figure 14).

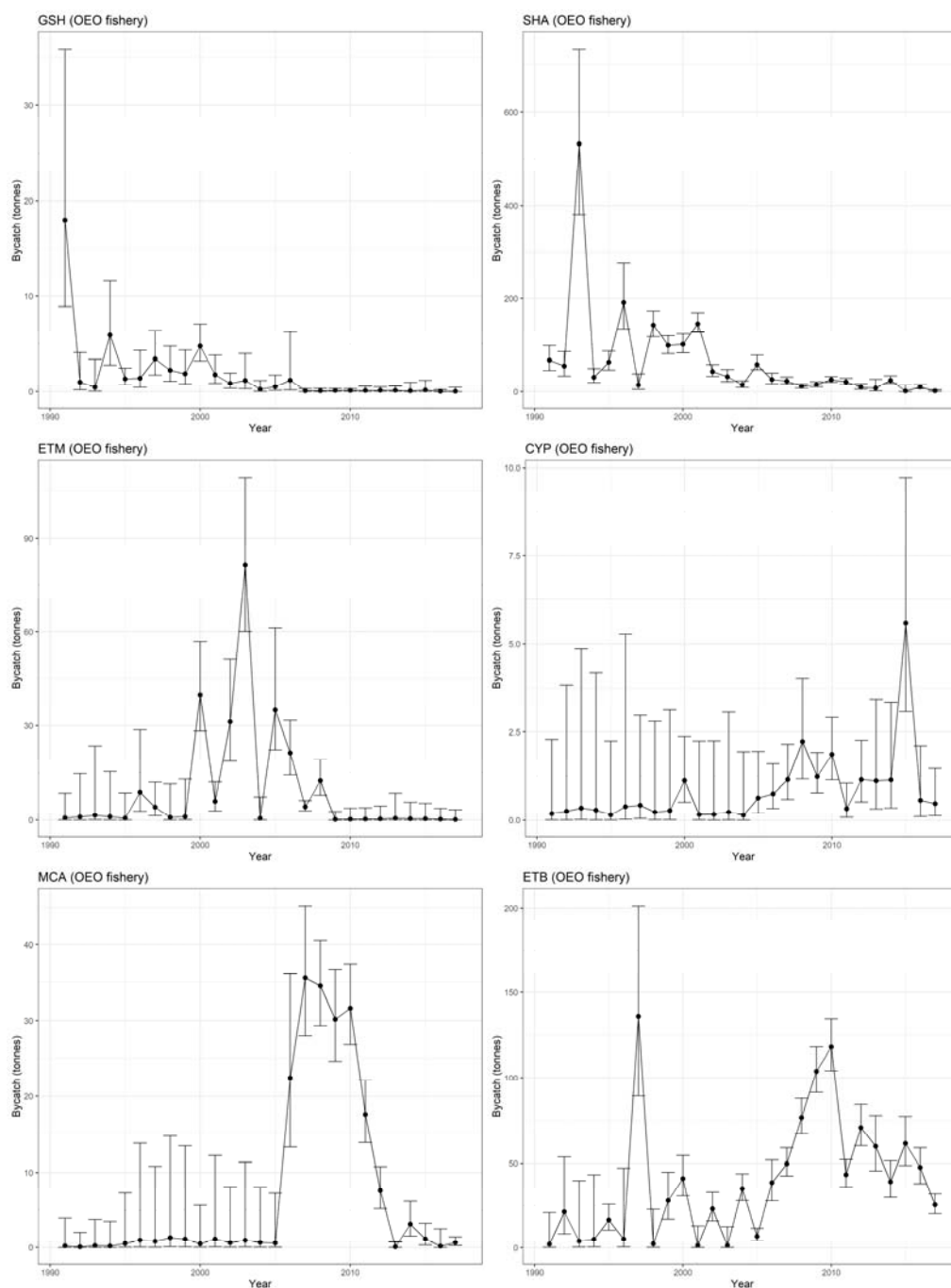


Figure 13: Annual bycatch estimates in the oreo trawl fishery for the species showing the greatest increases and declines between 1990–91 and 2016–17. See text above for explanation of the species codes. Note: the scale changes on the y-axis between plots.

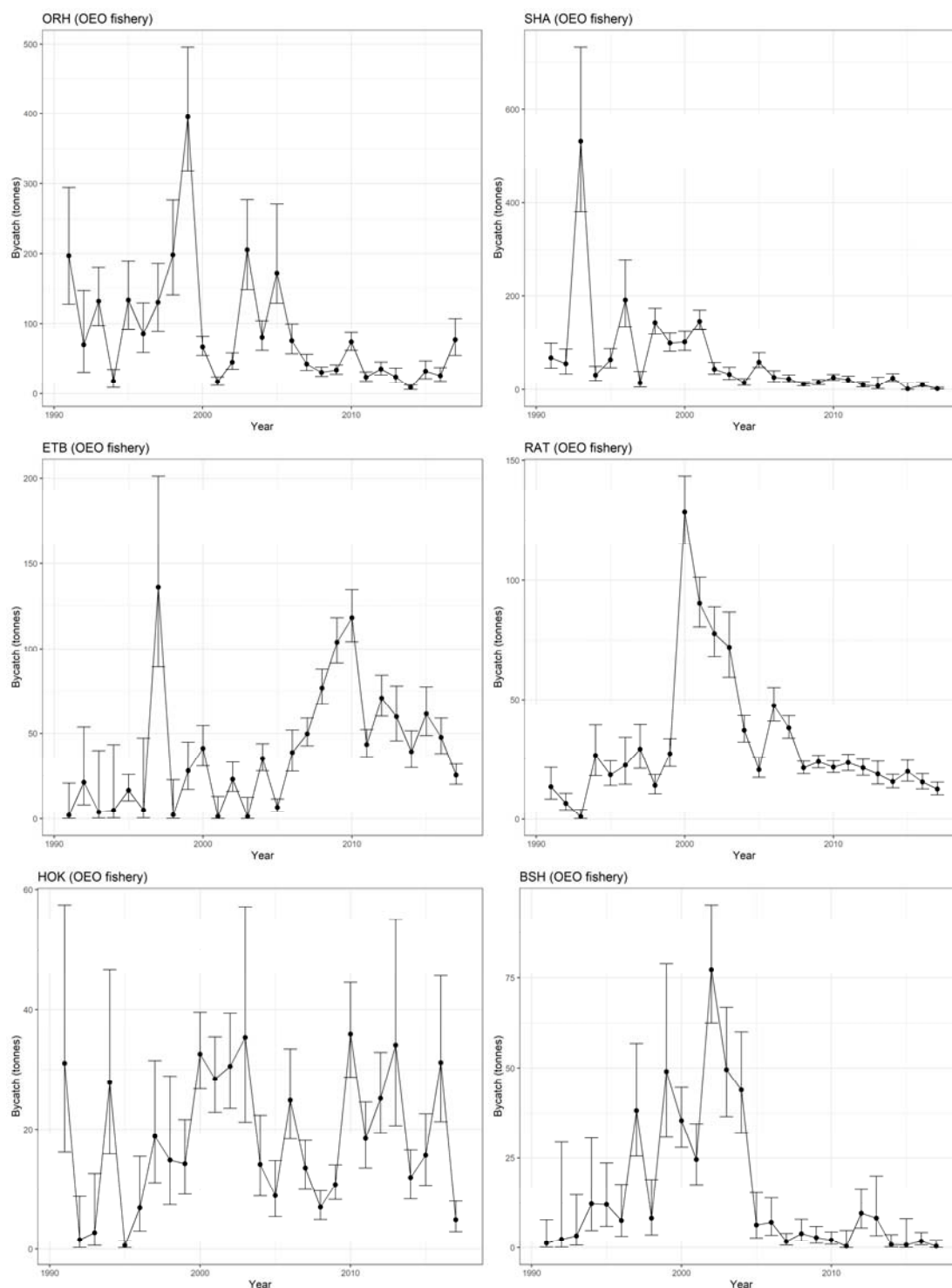


Figure 14: Annual bycatch estimates for the most common oreo trawl fishery bycatch species by weight between 1990–91 and 2016–17. See <http://marlin.niwa.co.nz> or Table 10 for species code definitions. Note: the scale changes on the y-axis between plots. ORH, SHA, and BSH had significant decreasing trends, ETB had an increasing significant trend, and RAT and HOK had increasing non-significant trends.

Table 6: Oreo trawl fishery. Total annual bycatch estimates (t) (with estimated 95% CIs) and slope of the regression for the top 50 individual species in this fishery (see <http://marlin.niwa.co.nz> for species code definitions). Species are ordered by decreasing total catch.

	ORH	SHA	ETB	RAT	HOK	BSH	SLK	ETM	BEE	MCA
1990–91	197 (128–294)	68 (46–98)	2 (0–21)	13 (8–22)	31 (16–57)	1 (0–8)	1 (0–4)	1 (0–9)	4 (2–7)	<1 (0–4)
1991–92	69 (31–147)	55 (34–86)	21 (8–54)	7 (4–11)	2 (0–9)	2 (0–29)	1 (0–15)	1 (0–15)	2 (1–6)	<1 (0–2)
1992–93	132 (97–181)	531 (381–734)	4 (0–40)	1 (0–4)	3 (1–13)	3 (1–15)	3 (0–28)	2 (0–24)	3 (1–15)	<1 (0–4)
1993–94	18 (9–34)	31 (20–50)	5 (0–43)	27 (18–39)	28 (16–47)	12 (5–30)	5 (2–17)	1 (0–15)	1 (0–9)	<1 (0–4)
1994–95	133 (91–190)	64 (46–87)	17 (11–26)	18 (14–24)	1 (0–1)	12 (6–24)	2 (0–6)	1 (0–9)	2 (1–4)	1 (0–7)
1995–96	84 (59–129)	191 (134–278)	5 (1–47)	22 (15–34)	7 (3–16)	8 (3–18)	12 (7–21)	9 (3–29)	11 (7–19)	1 (0–14)
1996–97	130 (88–186)	15 (5–39)	136 (89–201)	29 (21–39)	19 (11–31)	38 (26–57)	15 (9–26)	4 (1–12)	4 (2–8)	1 (0–11)
1997–98	198 (141–277)	143 (118–174)	2 (0–23)	14 (11–19)	15 (7–29)	8 (4–19)	10 (6–18)	1 (0–11)	5 (3–8)	1 (0–15)
1998–99	395 (318–496)	99 (81–120)	28 (17–45)	27 (22–34)	14 (9–22)	49 (31–79)	13 (8–21)	1 (0–13)	7 (5–10)	1 (0–13)
1999–00	66 (54–81)	101 (83–123)	41 (31–55)	128 (115–143)	33 (27–40)	35 (28–45)	20 (16–26)	40 (28–57)	9 (7–12)	<1 (0–6)
2000–01	17 (12–24)	146 (127–170)	1 (0–13)	90 (80–101)	28 (23–35)	25 (18–34)	13 (10–20)	6 (3–12)	8 (7–11)	1 (0–12)
2001–02	45 (35–58)	44 (33–58)	23 (16–33)	78 (68–89)	31 (24–39)	77 (62–95)	11 (8–16)	31 (19–51)	10 (8–13)	1 (0–8)
2002–03	205 (148–277)	32 (22–48)	1 (0–13)	72 (59–86)	35 (21–57)	50 (36–67)	21 (14–32)	81 (60–109)	17 (12–25)	1 (0–11)
2003–04	79 (61–104)	15 (9–23)	35 (28–44)	37 (32–43)	14 (9–22)	44 (32–60)	15 (11–19)	1 (0–7)	14 (11–18)	1 (0–8)
2004–05	173 (129–271)	58 (47–79)	7 (4–12)	21 (17–26)	9 (6–15)	6 (3–15)	10 (8–16)	35 (22–61)	9 (7–11)	1 (0–7)
2005–06	75 (57–99)	26 (17–40)	39 (28–52)	47 (41–55)	25 (18–33)	7 (4–14)	16 (12–20)	21 (14–32)	9 (7–11)	22 (13–36)
2006–07	42 (33–56)	23 (16–31)	50 (43–59)	38 (34–43)	14 (10–18)	2 (1–4)	10 (9–13)	4 (3–6)	15 (12–17)	36 (28–45)
2007–08	31 (25–38)	12 (8–17)	77 (67–88)	21 (19–24)	7 (5–10)	4 (2–8)	13 (11–16)	13 (8–19)	15 (13–18)	34 (29–41)
2008–09	34 (28–41)	15 (11–21)	104 (92–118)	24 (21–27)	11 (8–14)	3 (1–6)	12 (10–14)	<1 (0–3)	11 (9–13)	30 (25–37)
2009–10	73 (61–87)	26 (20–33)	118 (104–135)	22 (19–24)	36 (29–45)	2 (1–4)	18 (15–21)	<1 (0–4)	11 (9–12)	32 (27–37)
2010–11	24 (18–31)	21 (15–29)	43 (36–52)	23 (20–27)	18 (14–25)	<1 (0–5)	11 (8–13)	<1 (0–4)	6 (5–8)	18 (14–22)
2011–12	35 (27–45)	10 (5–17)	71 (60–84)	21 (18–25)	25 (19–33)	10 (6–16)	13 (10–17)	<1 (0–5)	9 (7–11)	8 (5–11)
2012–13	24 (15–37)	8 (2–27)	60 (46–78)	19 (15–24)	34 (21–55)	8 (3–20)	9 (6–13)	1 (0–9)	7 (4–10)	<1 (0–1)
2013–14	9 (6–12)	25 (18–34)	39 (30–51)	16 (13–19)	12 (8–17)	1 (0–4)	15 (12–19)	<1 (0–6)	7 (5–8)	3 (2–6)
2014–15	32 (21–47)	1 (0–14)	61 (49–78)	20 (16–24)	16 (11–23)	1 (0–8)	5 (3–9)	<1 (0–5)	6 (4–8)	1 (0–3)
2015–16	26 (18–37)	10 (6–15)	48 (38–59)	15 (13–19)	31 (21–46)	2 (1–4)	3 (2–5)	<1 (0–4)	3 (2–4)	<1 (0–3)
2016–17	76 (54–107)	2 (1–4)	25 (20–32)	13 (10–15)	5 (3–8)	<1 (0–2)	10 (7–13)	<1 (0–3)	2 (2–3)	1 (0–1)
slope	–0.06	–0.13	0.1	0.02	0.03	–0.1	0.04	–0.13	0.03	0.11

	WSQ	COU	HJO	MOD	JAV	GSP	HAK	LCH	WOE	SND
1990–91	1 (1–4)	<1 (0–3)	3 (1–6)	<1 (0–4)	12 (5–24)	<1 (0–3)	2 (1–5)	5 (2–11)	<1 (0–2)	1 (0–5)
1991–92	1 (0–4)	<1 (0–3)	7 (3–16)	1 (0–11)	<1 (0–5)	1 (0–7)	<1 (0–4)	<1 (0–3)	<1 (0–1)	1 (0–7)
1992–93	2 (0–9)	<1 (0–5)	1 (0–14)	2 (0–21)	1 (0–6)	1 (0–15)	1 (0–9)	1 (0–10)	<1 (0–3)	1 (0–17)
1993–94	1 (0–7)	<1 (0–3)	1 (0–11)	1 (0–10)	<1 (0–3)	1 (0–6)	1 (1–4)	1 (0–3)	<1 (0–2)	1 (0–7)
1994–95	1 (1–3)	<1 (0–3)	7 (5–11)	<1 (0–5)	<1 (0–1)	<1 (0–3)	<1 (0–2)	<1 (0–2)	<1 (0–1)	<1 (0–2)
1995–96	2 (1–6)	1 (0–7)	1 (0–12)	14 (8–24)	14 (4–43)	1 (0–5)	1 (0–5)	2 (1–5)	<1 (0–4)	1 (0–9)
1996–97	11 (7–17)	1 (0–4)	1 (0–10)	7 (3–12)	3 (2–5)	1 (0–7)	2 (1–4)	6 (4–11)	<1 (0–1)	1 (0–7)
1997–98	3 (2–7)	39 (18–83)	1 (0–5)	5 (3–11)	<1 (0–1)	1 (0–2)	1 (0–3)	2 (1–4)	<1 (0–2)	2 (0–8)
1998–99	6 (4–9)	9 (3–24)	1 (0–3)	3 (2–5)	2 (1–4)	1 (0–3)	4 (2–9)	3 (1–5)	21 (13–36)	2 (1–5)
1999–00	21 (17–25)	22 (15–33)	2 (1–3)	7 (6–10)	9 (7–12)	7 (5–9)	18 (13–23)	2 (1–3)	7 (4–11)	3 (2–6)
2000–01	12 (10–16)	7 (3–17)	9 (7–12)	3 (2–5)	6 (4–9)	7 (5–10)	9 (6–14)	3 (2–4)	14 (7–31)	2 (1–7)
2001–02	13 (10–16)	21 (13–33)	1 (0–4)	5 (3–8)	5 (3–7)	12 (9–16)	5 (4–8)	4 (2–5)	1 (0–6)	4 (2–8)
2002–03	5 (3–8)	31 (21–46)	<1 (0–1)	4 (2–9)	8 (4–15)	11 (6–19)	8 (3–20)	2 (1–5)	7 (3–19)	1 (0–6)
2003–04	7 (5–10)	2 (1–3)	2 (1–4)	4 (2–6)	1 (1–2)	3 (1–5)	4 (2–7)	2 (1–4)	<1 (0–2)	2 (1–5)
2004–05	7 (5–10)	13 (7–23)	2 (1–4)	8 (6–11)	1 (0–1)	3 (2–6)	1 (1–3)	1 (1–2)	<1 (0–2)	2 (1–5)
2005–06	9 (7–11)	2 (1–3)	5 (3–7)	5 (3–6)	2 (1–3)	5 (3–8)	5 (2–9)	3 (2–5)	<1 (0–1)	1 (0–4)
2006–07	8 (7–10)	<1 (0–1)	6 (4–9)	7 (5–9)	2 (1–2)	3 (3–5)	2 (1–3)	2 (1–2)	<1 (0–0)	1 (1–3)
2007–08	12 (11–15)	<1 (0–1)	5 (3–7)	6 (4–8)	3 (2–3)	3 (2–5)	1 (1–2)	3 (2–4)	<1 (0–1)	1 (0–1)
2008–09	7 (6–9)	<1 (0–0)	3 (2–4)	4 (3–5)	5 (4–6)	4 (3–5)	1 (1–2)	2 (2–3)	<1 (0–0)	1 (0–2)
2009–10	9 (8–11)	<1 (0–0)	5 (3–7)	6 (4–8)	6 (4–7)	4 (3–6)	1 (1–2)	3 (2–4)	<1 (0–0)	2 (1–3)
2010–11	3 (2–5)	<1 (0–0)	9 (6–13)	9 (7–12)	3 (2–5)	3 (2–5)	<1 (0–1)	1 (0–1)	<1 (0–1)	<1 (0–2)
2011–12	10 (8–12)	<1 (0–0)	9 (7–13)	7 (4–9)	1 (0–1)	2 (2–4)	1 (0–2)	1 (1–2)	<1 (0–1)	4 (2–7)
2012–13	7 (5–10)	<1 (0–1)	1 (0–3)	2 (1–4)	1 (1–2)	3 (2–6)	<1 (0–1)	1 (0–2)	<1 (0–1)	<1 (0–2)
2013–14	6 (4–8)	<1 (0–3)	13 (10–18)	10 (7–14)	1 (0–1)	2 (1–3)	1 (0–3)	3 (2–4)	<1 (0–1)	2 (1–5)
2014–15	8 (6–11)	<1 (0–1)	18 (14–25)	1 (0–2)	1 (0–1)	3 (2–5)	<1 (0–1)	2 (1–3)	<1 (0–0)	9 (5–15)
2015–16	4 (3–6)	<1 (0–0)	5 (3–8)	2 (1–3)	1 (1–2)	1 (0–2)	<1 (0–1)	1 (1–2)	<1 (0–1)	1 (0–2)
2016–17	3 (2–4)	<1 (0–0)	7 (5–10)	<1 (0–2)	<1 (0–1)	1 (0–2)	<1 (0–0)	1 (0–1)	<1 (0–1)	1 (0–2)
slope	0.05	–0.08	0.06	0.03	0	0.06	–0.07	0.02	–0.04	0.01

	CSQ	GSH	SPD	SQA	ETP	CHI	SMC	VCO	CYP	GRC
1990–91	<1 (0–3)	18 (9–36)	<1 (0–2)	<1 (0–4)	<1 (0–4)	1 (0–3)	<1 (0–1)	<1 (0–2)	<1 (0–2)	<1 (0–1)
1991–92	<1 (0–3)	1 (0–4)	<1 (0–2)	<1 (0–3)	<1 (0–3)	<1 (0–3)	<1 (0–2)	<1 (0–3)	<1 (0–4)	<1 (0–1)
1992–93	<1 (0–5)	<1 (0–3)	<1 (0–2)	<1 (0–4)	<1 (0–4)	<1 (0–4)	<1 (0–4)	<1 (0–3)	<1 (0–5)	<1 (0–1)
1993–94	<1 (0–3)	6 (3–12)	36 (16–76)	<1 (0–4)	<1 (0–4)	2 (1–6)	<1 (0–2)	<1 (0–3)	<1 (0–4)	<1 (0–1)
1994–95	<1 (0–3)	1 (1–2)	<1 (0–2)	<1 (0–3)	<1 (0–4)	<1 (0–2)	<1 (0–1)	<1 (0–1)	<1 (0–2)	<1 (0–2)
1995–96	37 (20–73)	1 (0–4)	<1 (0–3)	<1 (0–5)	<1 (0–6)	1 (0–6)	<1 (0–2)	<1 (0–3)	<1 (0–5)	<1 (0–3)
1996–97	<1 (0–5)	3 (2–6)	<1 (0–3)	<1 (0–5)	<1 (0–7)	<1 (0–4)	<1 (0–3)	<1 (0–2)	<1 (0–3)	<1 (0–3)
1997–98	<1 (0–4)	2 (1–5)	<1 (0–2)	<1 (0–4)	<1 (0–7)	1 (0–2)	<1 (0–1)	<1 (0–2)	<1 (0–3)	<1 (0–3)
1998–99	<1 (0–4)	2 (1–4)	<1 (0–3)	<1 (0–4)	<1 (0–6)	1 (0–2)	<1 (0–2)	<1 (0–1)	<1 (0–3)	<1 (0–4)
1999–00	4 (2–8)	5 (3–7)	<1 (0–2)	<1 (0–2)	31 (20–56)	2 (1–3)	<1 (0–1)	5 (3–8)	1 (1–2)	<1 (0–2)
2000–01	<1 (0–5)	2 (1–4)	<1 (0–2)	<1 (0–3)	<1 (0–5)	2 (1–3)	<1 (0–2)	<1 (0–1)	<1 (0–2)	<1 (0–4)
2001–02	<1 (0–2)	1 (0–2)	<1 (0–1)	<1 (0–2)	<1 (0–5)	1 (0–2)	2 (1–4)	<1 (0–1)	<1 (0–2)	<1 (0–2)
2002–03	<1 (0–3)	1 (0–4)	<1 (0–2)	<1 (0–2)	<1 (0–5)	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–3)	2 (0–9)
2003–04	<1 (0–3)	<1 (0–1)	<1 (0–1)	<1 (0–2)	<1 (0–4)	<1 (0–2)	<1 (0–1)	<1 (0–0)	<1 (0–2)	5 (3–10)
2004–05	<1 (0–3)	1 (0–2)	<1 (0–1)	6 (3–15)	<1 (0–4)	1 (1–2)	<1 (0–1)	<1 (0–1)	1 (0–2)	6 (4–12)
2005–06	1 (0–5)	1 (0–6)	<1 (0–1)	30 (19–48)	<1 (0–3)	2 (1–3)	<1 (0–1)	2 (1–3)	1 (0–2)	<1 (0–3)
2006–07	1 (0–2)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–2)	2 (1–3)	<1 (0–1)	<1 (0–1)	1 (1–2)	<1 (0–1)
2007–08	<1 (0–1)	<1 (0–0)	1 (0–3)	<1 (0–1)	<1 (0–2)	<1 (0–1)	<1 (0–1)	2 (2–3)	2 (1–4)	1 (0–2)
2008–09	<1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–1)	<1 (0–2)	<1 (0–1)	<1 (0–0)	4 (3–5)	1 (1–2)	<1 (0–0)
2009–10	1 (0–2)	<1 (0–0)	<1 (0–1)	<1 (0–1)	<1 (0–2)	<1 (0–1)	<1 (0–0)	2 (2–3)	2 (1–3)	2 (1–4)
2010–11	1 (0–3)	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–2)	1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–1)
2011–12	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–3)	<1 (0–1)	1 (0–2)	2 (1–3)	1 (1–2)	<1 (0–1)
2012–13	<1 (0–1)	<1 (0–1)	<1 (0–2)	<1 (0–2)	<1 (0–3)	<1 (0–1)	16 (10–25)	3 (1–6)	1 (0–3)	<1 (0–1)
2013–14	1 (0–5)	<1 (0–1)	<1 (0–0)	<1 (0–2)	<1 (0–2)	2 (1–4)	<1 (0–0)	<1 (0–1)	1 (0–3)	<1 (0–1)
2014–15	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–3)	<1 (0–3)	1 (0–3)	2 (1–4)	<1 (0–1)	6 (3–10)	<1 (0–0)
2015–16	<1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–1)	<1 (0–1)	1 (0–1)	<1 (0–0)	<1 (0–1)	1 (0–2)	2 (1–3)
2016–17	<1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–1)	<1 (0–1)	1 (1–2)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)
slope	0	–0.16	–0.03	0.01	–0.01	0.01	0.06	0.06	0.11	0.04

	RIB	SSM	HTH	LIN	CHG	ASR	SOR	ECN	PLS	MIQ
1990–91	3 (1–7)	<1 (0–2)	<1 (0–1)	6 (3–14)	<1 (0–2)	<1 (0–0)	1 (0–7)	<1 (0–1)	<1 (0–4)	4 (2–8)
1991–92	<1 (0–2)	<1 (0–2)	<1 (0–1)	<1 (0–3)	<1 (0–2)	<1 (0–1)	<1 (0–3)	<1 (0–1)	<1 (0–2)	1 (0–4)
1992–93	<1 (0–3)	<1 (0–4)	<1 (0–3)	<1 (0–4)	<1 (0–3)	<1 (0–1)	<1 (0–3)	<1 (0–1)	<1 (0–4)	<1 (0–2)
1993–94	<1 (0–2)	<1 (0–2)	<1 (0–1)	4 (1–9)	<1 (0–3)	<1 (0–1)	<1 (0–3)	<1 (0–1)	<1 (0–3)	<1 (0–2)
1994–95	1 (0–3)	<1 (0–2)	<1 (0–1)	<1 (0–2)	<1 (0–2)	<1 (0–0)	<1 (0–3)	<1 (0–1)	<1 (0–3)	<1 (0–2)
1995–96	2 (1–12)	<1 (0–4)	<1 (0–2)	<1 (0–4)	<1 (0–4)	<1 (0–1)	<1 (0–4)	<1 (0–1)	<1 (0–6)	<1 (0–2)
1996–97	1 (0–3)	<1 (0–5)	<1 (0–2)	<1 (0–2)	<1 (0–3)	<1 (0–1)	<1 (0–3)	<1 (0–2)	<1 (0–4)	<1 (0–2)
1997–98	<1 (0–2)	<1 (0–4)	<1 (0–1)	<1 (0–2)	<1 (0–2)	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–3)	<1 (0–2)
1998–99	<1 (0–1)	<1 (0–5)	11 (3–35)	<1 (0–2)	1 (0–2)	8 (3–21)	<1 (0–1)	1 (0–3)	<1 (0–3)	<1 (0–2)
1999–00	1 (0–1)	<1 (0–2)	1 (1–2)	<1 (0–1)	1 (0–2)	1 (1–1)	<1 (0–0)	4 (3–5)	5 (3–11)	<1 (0–1)
2000–01	1 (0–3)	<1 (0–3)	<1 (0–0)	<1 (0–1)	<1 (0–2)	<1 (0–0)	1 (0–2)	<1 (0–1)	<1 (0–5)	<1 (0–1)
2001–02	1 (1–2)	<1 (0–3)	<1 (0–1)	2 (1–3)	1 (0–3)	<1 (0–1)	<1 (0–1)	1 (0–3)	<1 (0–2)	<1 (0–1)
2002–03	1 (0–4)	<1 (0–4)	<1 (0–1)	1 (0–5)	<1 (0–2)	<1 (0–1)	<1 (0–1)	2 (1–4)	<1 (0–3)	<1 (0–1)
2003–04	<1 (0–1)	<1 (0–2)	<1 (0–0)	<1 (0–1)	1 (0–2)	<1 (0–0)	1 (0–3)	<1 (0–1)	1 (0–4)	<1 (0–1)
2004–05	1 (0–2)	<1 (0–2)	<1 (0–0)	<1 (0–1)	1 (0–3)	<1 (0–0)	1 (0–2)	<1 (0–0)	1 (0–7)	<1 (0–1)
2005–06	<1 (0–1)	<1 (0–2)	<1 (0–0)	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–3)	<1 (0–1)
2006–07	1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)
2007–08	<1 (0–0)	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–2)	<1 (0–1)
2008–09	1 (0–1)	<1 (0–1)	1 (0–1)	<1 (0–1)	1 (1–2)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	1 (1–2)
2009–10	1 (1–2)	<1 (0–1)	1 (1–1)	<1 (0–1)	2 (1–3)	<1 (0–0)	1 (0–2)	<1 (0–0)	<1 (0–2)	1 (1–2)
2010–11	1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–1)	<1 (0–1)	1 (1–2)
2011–12	<1 (0–1)	1 (0–2)	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–2)	<1 (0–1)
2012–13	<1 (0–1)	1 (0–6)	<1 (0–1)	<1 (0–2)	1 (0–2)	<1 (0–0)	1 (0–4)	<1 (0–0)	<1 (0–1)	<1 (0–1)
2013–14	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–1)	1 (1–2)	1 (0–1)	4 (1–14)	1 (0–1)	<1 (0–2)	<1 (0–1)
2014–15	<1 (0–2)	10 (7–14)	<1 (0–0)	<1 (0–1)	1 (0–2)	<1 (0–0)	<1 (0–1)	<1 (0–0)	2 (1–5)	<1 (0–1)
2015–16	<1 (0–1)	4 (2–7)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–0)
2016–17	<1 (0–0)	<1 (0–2)	<1 (0–0)	<1 (0–0)	1 (0–2)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)
slope	–0.05	0.08	0	–0.06	0.06	0	0.02	–0.01	0.01	–0.02

	BSL	CDL	CHP	SKA	ETL	PSE	SSK	SVA	TAM	TOA
1990–91	<1 (0–4)	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–2)	<1 (0–1)	<1 (0–2)	<1 (0–1)	<1 (0–0)	<1 (0–1)
1991–92	<1 (0–2)	<1 (0–2)	<1 (0–2)	<1 (0–1)	<1 (0–2)	<1 (0–1)	<1 (0–3)	<1 (0–1)	<1 (0–1)	<1 (0–1)
1992–93	<1 (0–2)	<1 (0–2)	<1 (0–3)	<1 (0–2)	<1 (0–3)	<1 (0–1)	<1 (0–4)	<1 (0–1)	<1 (0–1)	<1 (0–2)
1993–94	1 (0–3)	<1 (0–2)	<1 (0–2)	<1 (0–1)	<1 (0–3)	<1 (0–1)	<1 (0–2)	<1 (0–1)	<1 (0–1)	<1 (0–1)
1994–95	<1 (0–2)	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–2)	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–1)
1995–96	<1 (0–4)	<1 (0–2)	<1 (0–2)	1 (0–2)	<1 (0–3)	<1 (0–1)	<1 (0–3)	<1 (0–2)	<1 (0–1)	<1 (0–1)
1996–97	<1 (0–4)	6 (3–13)	<1 (0–3)	<1 (0–2)	<1 (0–3)	<1 (0–1)	<1 (0–2)	<1 (0–2)	<1 (0–1)	<1 (0–1)
1997–98	<1 (0–3)	<1 (0–2)	<1 (0–2)	<1 (0–1)	<1 (0–2)	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–1)
1998–99	<1 (0–4)	<1 (0–2)	<1 (0–2)	2 (1–4)	<1 (0–2)	<1 (0–1)	<1 (0–3)	<1 (0–1)	<1 (0–1)	<1 (0–1)
1999–00	<1 (0–2)	<1 (0–1)	1 (0–2)	2 (2–3)	<1 (0–0)	6 (3–10)	1 (0–1)	<1 (0–1)	<1 (0–0)	2 (1–3)
2000–01	<1 (0–3)	<1 (0–2)	<1 (0–1)	1 (1–2)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–2)	<1 (0–0)	1 (1–1)
2001–02	3 (1–10)	<1 (0–1)	<1 (0–1)	1 (1–2)	<1 (0–1)	<1 (0–1)	<1 (0–2)	<1 (0–1)	<1 (0–0)	<1 (0–1)
2002–03	<1 (0–3)	<1 (0–1)	<1 (0–1)	<1 (0–1)	4 (2–8)	<1 (0–1)	1 (0–2)	<1 (0–1)	<1 (0–1)	<1 (0–1)
2003–04	<1 (0–4)	<1 (0–2)	1 (0–2)	<1 (0–1)	1 (0–3)	<1 (0–1)	1 (0–2)	<1 (0–1)	<1 (0–0)	<1 (0–1)
2004–05	<1 (0–2)	1 (0–4)	<1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–1)
2005–06	<1 (0–2)	<1 (0–1)	1 (0–3)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–1)	1 (0–1)	1 (0–1)
2006–07	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–1)	1 (1–2)	<1 (0–0)
2007–08	1 (0–1)	<1 (0–1)	1 (0–2)	<1 (0–0)	<1 (0–2)	<1 (0–0)	<1 (0–0)	5 (2–10)	1 (1–1)	<1 (0–0)
2008–09	<1 (0–0)	<1 (0–0)	1 (1–2)	<1 (0–0)	1 (0–2)	<1 (0–0)	<1 (0–0)	<1 (0–1)	1 (1–1)	<1 (0–0)
2009–10	1 (0–2)	<1 (0–1)	1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	1 (1–1)	<1 (0–0)
2010–11	<1 (0–4)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–0)
2011–12	1 (1–3)	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–0)	2 (0–15)	<1 (0–0)	<1 (0–1)	<1 (0–0)
2012–13	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–2)	<1 (0–0)	<1 (0–1)	<1 (0–1)
2013–14	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–0)
2014–15	<1 (0–1)	<1 (0–1)	1 (0–2)	<1 (0–0)	<1 (0–1)	<1 (0–1)	<1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–0)
2015–16	<1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)
2016–17	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–0)	<1 (0–1)	<1 (0–0)	<1 (0–0)	<1 (0–0)
slope	0.01	–0.02	0.03	–0.03	0	–0.01	0.01	0.01	0.03	–0.01

Hoki, hake, and ling trawl fishery

- Of the 493 bycatch species examined, 132 showed a decrease in catch over time and 35 were significant; 210 showed an increase and 83 were significant
- Species showing the greatest decline were unspecified skates (SKA), lanternshark (ETM), and moonfish (MOO) (Figure 15)
- Species showing the greatest increase were umbrella octopus (*Opisthoteuthis* spp., OPI), tam-O'shanter urchins (Echinothuriidae & Phormosomatidae, TAM), and floppy tubular sponge (*Hyalascus* sp., HYA) (Figure 15)
- Most common bycatch species by weight (t) were javelinfish (*Lepidorhynchus denticulatus*, JAV), unspecified rattails (RAT), and silver warehou (SWA) (Figure 16).

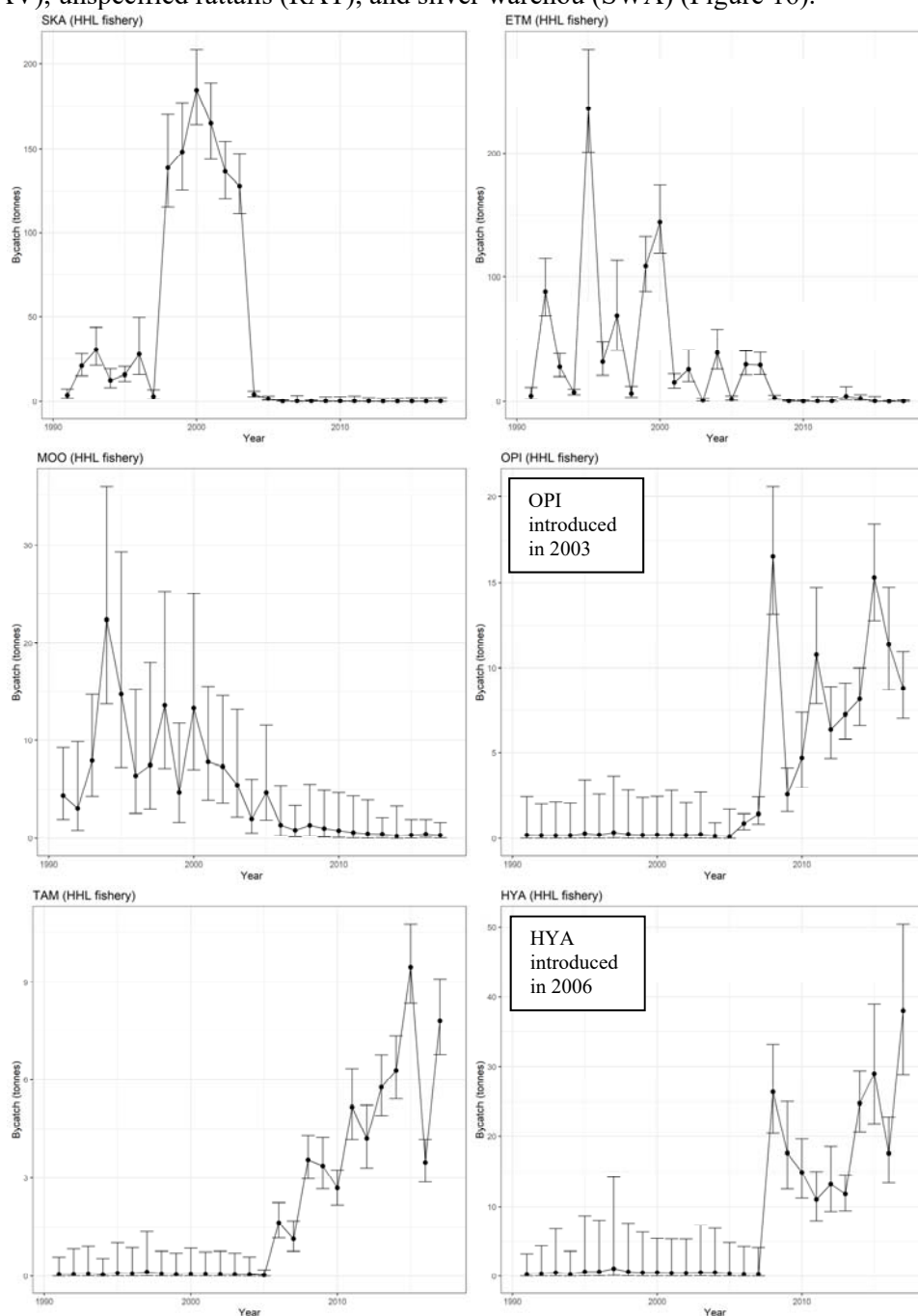


Figure 15: Annual bycatch estimates in the hoki, hake, ling trawl fishery for the species showing the greatest increases and declines between 1990–91 and 2016–17. See text above for explanation of the species codes. The codes OPI and HYA were introduced in 2003 and 2006, respectively, so no catches were reported under these codes prior to the introduction dates. Note: the scale changes on the y-axis between plots.

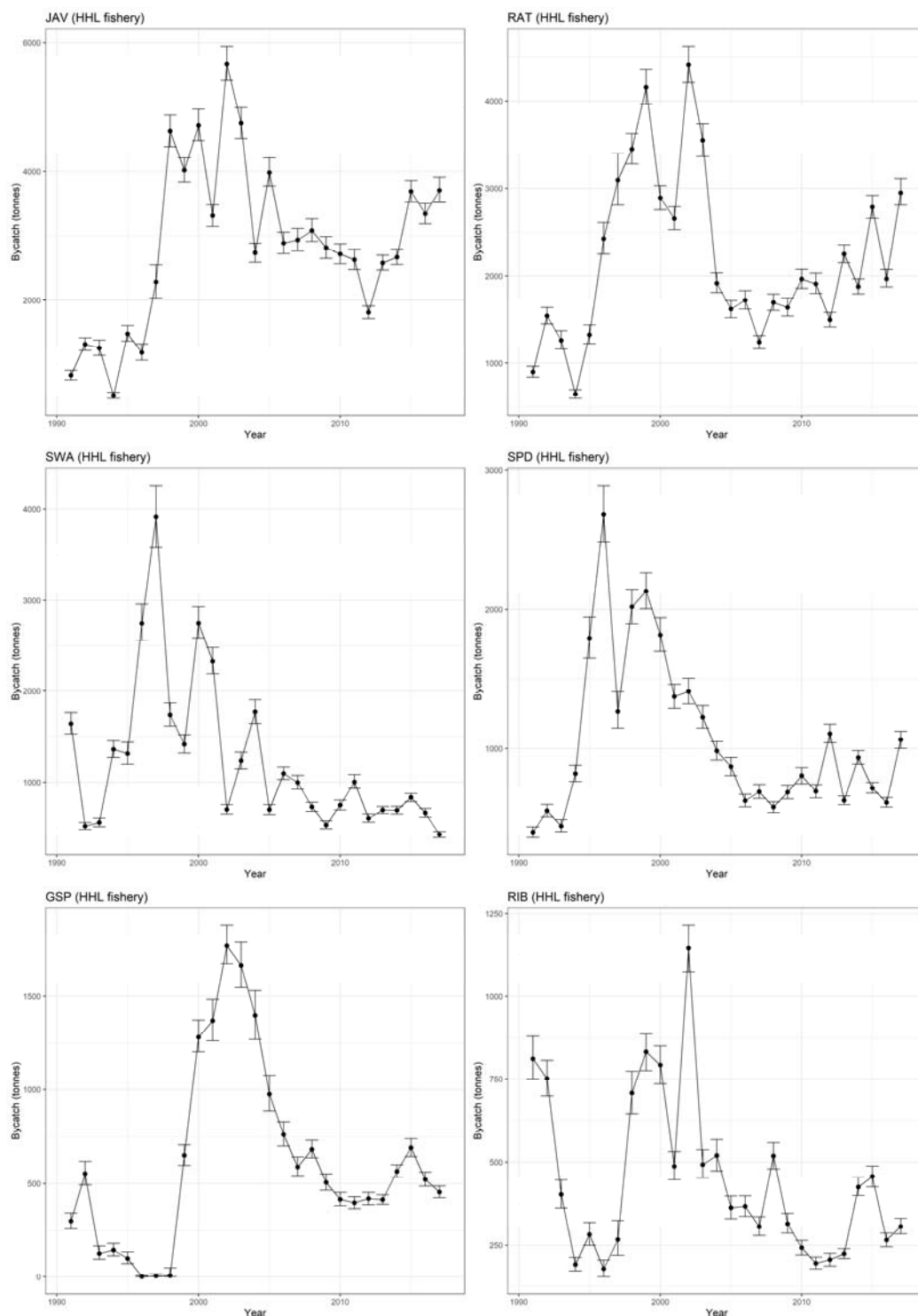


Figure 16: Annual bycatch estimates for the most common hoki, hake, and ling trawl fishery bycatch species by weight between 1990–91 and 2016–17. See <http://marlin.niwa.co.nz> or Table 10 for species code definitions. Note: the scale changes on the y-axis between plots. SWA had a non-significant decreasing trend, SPD and RIB had non-significant decreasing trends, JAV and GSP had increasing significant trends, and RAT had an increasing non-significant trend.

Table 7: Hoki, hake, and ling trawl fishery. Total annual bycatch estimates (t) (with estimated 95% CIs) and slope of the regression for the top 50 individual species in this fishery (see <http://marlin.niwa.co.nz> for species code definitions). Species are ordered by decreasing total catch.

	JAV	RAT	SWA	SPD	GSP	RIB	FRO	SPE	LDO	WWA
1990–91	823 (752–900)	899 (840–963)	1641 (1529–1763)	395 (357–434)	300 (260–344)	812 (750–880)	649 (594–708)	214 (196–234)	242 (224–262)	130 (114–145)
1991–92	1303 (1208–1406)	1543 (1450–1641)	513 (475–554)	551 (508–597)	552 (493–618)	751 (698–807)	517 (468–577)	314 (286–345)	284 (263–305)	221 (204–239)
1992–93	1244 (1131–1370)	1259 (1160–1372)	554 (506–603)	441 (399–487)	125 (94–166)	403 (363–447)	320 (287–357)	331 (288–382)	225 (204–249)	217 (187–250)
1993–94	510 (469–556)	647 (601–697)	1360 (1272–1454)	820 (763–880)	144 (113–180)	191 (171–213)	871 (810–939)	233 (210–260)	209 (193–228)	64 (54–74)
1994–95	1468 (1354–1600)	1324 (1221–1439)	1313 (1199–1440)	1791 (1647–1944)	99 (71–134)	282 (249–319)	1042 (949–1142)	263 (231–296)	205 (186–228)	76 (62–93)
1995–96	1175 (1058–1307)	2424 (2251–2608)	2743 (2548–2957)	2682 (2487–2889)	1 (0–6)	178 (154–205)	578 (520–640)	290 (254–331)	220 (198–244)	208 (178–244)
1996–97	2281 (2031–2545)	3095 (2806–3400)	3915 (3579–4259)	1265 (1146–1407)	4 (1–14)	267 (219–325)	1034 (923–1159)	205 (168–247)	220 (195–249)	115 (91–146)
1997–98	4631 (4388–4878)	3453 (3282–3629)	1738 (1615–1869)	2019 (1895–2145)	5 (1–48)	707 (646–773)	734 (666–817)	521 (478–569)	414 (385–443)	314 (280–349)
1998–99	4018 (3835–4217)	4157 (3962–4357)	1415 (1319–1520)	2132 (2005–2265)	650 (596–706)	833 (775–888)	514 (464–568)	828 (772–887)	764 (716–814)	274 (250–299)
1999–00	4717 (4485–4969)	2889 (2752–3031)	2745 (2581–2929)	1815 (1696–1940)	1282 (1203–1373)	793 (735–851)	651 (597–708)	668 (607–731)	414 (385–444)	368 (335–403)
2000–01	3307 (3142–3476)	2651 (2526–2788)	2325 (2189–2476)	1372 (1288–1461)	1370 (1263–1483)	487 (448–532)	890 (823–964)	607 (560–658)	509 (477–545)	485 (443–533)
2001–02	5665 (5417–5942)	4408 (4211–4621)	697 (645–752)	1409 (1320–1504)	1768 (1673–1880)	1145 (1074–1215)	355 (323–388)	974 (911–1040)	750 (706–796)	478 (439–519)
2002–03	4752 (4516–4996)	3553 (3368–3739)	1236 (1147–1329)	1225 (1146–1307)	1664 (1546–1787)	493 (453–537)	640 (584–700)	832 (772–899)	749 (700–802)	546 (502–596)
2003–04	2731 (2585–2880)	1919 (1812–2036)	1773 (1643–1904)	983 (917–1050)	1398 (1270–1530)	520 (474–568)	364 (334–396)	596 (545–652)	445 (417–477)	674 (613–740)
2004–05	3980 (3770–4217)	1621 (1522–1721)	695 (640–752)	870 (807–936)	975 (886–1075)	363 (330–399)	379 (348–415)	512 (471–557)	353 (324–381)	640 (582–705)
2005–06	2882 (2719–3050)	1724 (1623–1833)	1096 (1031–1168)	625 (580–671)	760 (699–828)	367 (337–399)	178 (159–198)	367 (339–395)	406 (378–436)	592 (545–641)
2006–07	2930 (2763–3112)	1239 (1165–1316)	999 (924–1077)	690 (640–743)	588 (541–641)	307 (280–336)	294 (259–332)	278 (254–306)	315 (291–340)	760 (695–835)
2007–08	3078 (2910–3258)	1699 (1605–1794)	725 (676–777)	577 (538–617)	681 (636–731)	518 (479–559)	156 (136–179)	307 (284–331)	278 (260–298)	586 (540–629)
2008–09	2811 (2646–2983)	1639 (1541–1749)	525 (482–573)	686 (638–738)	506 (464–550)	315 (287–346)	173 (151–197)	140 (126–156)	205 (189–223)	350 (318–384)
2009–10	2712 (2561–2871)	1966 (1860–2077)	745 (691–802)	807 (747–864)	415 (382–453)	242 (220–265)	65 (56–75)	366 (339–393)	300 (280–322)	406 (373–442)
2010–11	2624 (2474–2787)	1911 (1801–2032)	1003 (933–1084)	692 (645–742)	398 (367–430)	195 (177–214)	61 (53–71)	337 (311–364)	313 (291–336)	239 (218–264)
2011–12	1807 (1709–1908)	1497 (1414–1583)	599 (557–646)	1107 (1042–1174)	420 (387–453)	206 (186–225)	113 (102–127)	281 (260–301)	245 (228–263)	249 (225–275)
2012–13	2574 (2466–2695)	2249 (2150–2354)	690 (653–731)	627 (597–659)	414 (389–440)	224 (209–239)	134 (124–144)	310 (292–330)	367 (349–388)	255 (238–275)
2013–14	2664 (2549–2789)	1879 (1796–1967)	688 (645–731)	935 (888–984)	564 (531–599)	425 (400–454)	205 (189–222)	254 (238–271)	405 (382–428)	412 (385–443)
2014–15	3685 (3517–3856)	2783 (2655–2919)	832 (784–877)	717 (681–757)	690 (643–739)	457 (426–488)	383 (358–411)	456 (429–485)	539 (510–571)	277 (254–299)
2015–16	3336 (3182–3496)	1968 (1875–2075)	659 (612–707)	611 (577–647)	522 (487–560)	265 (245–287)	304 (283–326)	330 (309–351)	378 (358–399)	197 (180–217)
2016–17	3702 (3515–3908)	2948 (2806–3112)	418 (386–452)	1063 (1002–1124)	454 (425–488)	307 (285–331)	126 (114–139)	414 (388–441)	417 (394–444)	216 (197–237)
slope	0.04	0.01	–0.04	–0.01	0.09	–0.02	–0.07	0	0.01	0.03

	GSH	GIZ	SHA	SND	SQU	JMA	SSK	BSK	WSQ	RSO
1990–91	366 (331–404)	291 (258–328)	445 (395–500)	280 (244–318)	175 (162–190)	360 (264–857)	117 (100–135)	217 (39–924)	130 (118–145)	130 (113–151)
1991–92	548 (503–592)	182 (167–200)	232 (203–263)	217 (194–243)	163 (151–175)	260 (158–711)	98 (83–114)	107 (12–646)	221 (202–244)	88 (77–101)
1992–93	391 (347–439)	131 (112–153)	148 (120–180)	156 (128–188)	82 (74–92)	59 (22–283)	48 (39–60)	29 (0–436)	71 (60–86)	118 (102–137)
1993–94	406 (364–454)	49 (42–58)	88 (75–103)	164 (144–187)	98 (90–107)	264 (174–666)	58 (46–74)	134 (19–702)	75 (67–85)	182 (160–208)
1994–95	487 (432–553)	76 (62–93)	52 (39–69)	112 (94–133)	247 (226–268)	1358 (681–4016)	64 (48–86)	324 (36–2087)	120 (103–139)	53 (42–67)
1995–96	436 (385–494)	202 (172–234)	187 (156–226)	55 (43–71)	90 (81–100)	1055 (503–3523)	107 (87–131)	34 (4–202)	101 (87–117)	100 (80–126)
1996–97	360 (294–442)	115 (89–146)	69 (53–91)	75 (58–97)	89 (80–101)	378 (242–934)	51 (35–75)	379 (55–2413)	83 (68–102)	87 (61–121)
1997–98	1255 (1169–1347)	239 (216–266)	296 (263–333)	164 (142–188)	200 (183–217)	179 (112–552)	149 (124–179)	408 (173–1013)	207 (188–227)	109 (76–152)
1998–99	528 (471–593)	348 (318–381)	681 (622–743)	157 (134–184)	215 (198–232)	177 (90–654)	113 (95–134)	357 (105–1055)	195 (178–213)	18 (12–27)
1999–00	221 (193–253)	223 (200–250)	748 (673–829)	498 (439–564)	132 (121–145)	64 (37–210)	66 (50–86)	58 (11–291)	194 (180–209)	97 (76–122)
2000–01	142 (121–166)	378 (342–416)	491 (441–546)	176 (152–205)	248 (231–267)	27 (15–105)	122 (100–150)	138 (26–590)	170 (156–186)	52 (41–65)
2001–02	164 (140–190)	477 (438–518)	397 (356–441)	503 (450–561)	390 (367–417)	13 (8–57)	194 (169–224)	17 (1–144)	353 (328–378)	82 (70–97)
2002–03	128 (109–149)	387 (351–427)	287 (253–326)	248 (213–287)	260 (239–282)	34 (20–119)	225 (192–265)	332 (84–1224)	170 (156–185)	252 (222–284)
2003–04	157 (134–184)	391 (351–435)	446 (394–507)	250 (216–288)	285 (262–309)	40 (29–106)	203 (178–229)	236 (45–1060)	174 (157–193)	407 (367–455)
2004–05	132 (112–156)	346 (311–384)	167 (148–188)	220 (193–249)	190 (176–205)	27 (20–79)	132 (114–154)	395 (37–2528)	91 (80–104)	151 (132–174)
2005–06	40 (33–47)	278 (252–306)	231 (205–258)	334 (301–370)	207 (192–223)	31 (17–116)	221 (197–247)	15 (0–274)	81 (74–90)	102 (89–119)
2006–07	33 (27–39)	217 (196–239)	150 (129–175)	155 (135–178)	199 (183–216)	12 (7–54)	122 (106–140)	1 (0–9)	58 (51–65)	36 (29–46)
2007–08	36 (30–43)	176 (160–195)	233 (200–272)	353 (321–388)	155 (145–166)	17 (7–90)	146 (130–163)	33 (1–339)	80 (72–88)	19 (14–25)
2008–09	29 (24–36)	112 (100–126)	167 (141–196)	235 (208–266)	99 (90–108)	10 (4–59)	112 (97–129)	14 (0–253)	55 (48–63)	58 (48–71)
2009–10	58 (50–67)	153 (138–168)	105 (89–125)	148 (130–170)	167 (155–181)	5 (3–27)	163 (146–182)	37 (1–369)	85 (76–94)	52 (43–64)
2010–11	49 (42–57)	174 (158–191)	103 (88–119)	184 (160–212)	156 (144–168)	3 (1–21)	200 (179–222)	40 (1–387)	49 (43–55)	142 (119–170)
2011–12	72 (63–83)	104 (94–116)	117 (102–135)	86 (72–101)	143 (132–154)	20 (11–106)	132 (117–149)	11 (1–73)	47 (41–53)	49 (40–61)
2012–13	49 (44–55)	197 (184–211)	52 (44–61)	154 (140–171)	140 (133–148)	12 (7–68)	227 (210–247)	8 (1–41)	79 (73–85)	130 (113–151)
2013–14	46 (41–52)	192 (178–207)	49 (41–58)	200 (179–222)	168 (158–178)	6 (4–27)	242 (221–264)	9 (0–186)	82 (76–89)	169 (143–203)
2014–15	60 (53–67)	288 (267–311)	35 (30–42)	160 (144–179)	308 (292–325)	24 (18–73)	313 (286–341)	11 (0–230)	88 (81–97)	89 (80–101)
2015–16	91 (81–102)	210 (194–229)	38 (31–46)	197 (177–219)	188 (177–199)	20 (16–50)	274 (251–301)	10 (0–173)	56 (51–62)	122 (109–138)
2016–17	53 (47–60)	192 (177–207)	21 (15–28)	168 (151–187)	223 (209–238)	9 (6–34)	255 (233–279)	11 (0–190)	107 (97–117)	301 (272–337)
slope	–0.11	0.01	–0.07	0	0.01	–0.17	0.05	–0.13	–0.03	0.01

	BOE	BSH	POS	RCO	BNS	RBM	LCH	MDO	BAR	RUD
1990–91	24 (17–34)	78 (64–93)	70 (48–99)	154 (134–177)	148 (130–167)	26 (22–31)	59 (51–68)	34 (13–84)	77 (62–96)	48 (40–56)
1991–92	222 (182–267)	46 (37–56)	37 (22–59)	87 (78–98)	94 (83–106)	21 (17–25)	62 (55–71)	22 (4–106)	120 (99–144)	28 (23–35)
1992–93	63 (43–92)	115 (93–144)	67 (47–95)	83 (72–96)	84 (72–99)	91 (79–103)	28 (22–34)	87 (27–266)	58 (45–74)	61 (50–74)
1993–94	70 (55–90)	27 (22–35)	79 (58–106)	113 (100–129)	76 (65–89)	125 (114–137)	32 (26–38)	16 (2–150)	78 (66–93)	52 (44–61)
1994–95	51 (37–69)	16 (11–24)	119 (88–165)	272 (241–307)	86 (69–106)	122 (107–138)	63 (53–74)	61 (7–581)	266 (224–319)	100 (84–119)
1995–96	14 (9–23)	11 (8–17)	177 (137–229)	421 (377–468)	317 (278–361)	165 (148–184)	37 (29–47)	38 (14–96)	380 (318–466)	119 (102–139)
1996–97	7 (3–19)	23 (16–33)	256 (194–341)	89 (74–108)	220 (181–268)	226 (198–258)	35 (27–45)	98 (10–924)	121 (91–164)	117 (94–143)
1997–98	435 (357–528)	99 (81–119)	399 (336–485)	110 (94–127)	325 (281–374)	264 (240–291)	77 (66–89)	186 (109–298)	58 (44–79)	90 (79–103)
1998–99	111 (87–141)	332 (293–376)	198 (159–249)	89 (78–103)	146 (127–168)	134 (117–153)	94 (80–109)	46 (14–137)	62 (49–80)	79 (67–92)
1999–00	172 (125–233)	178 (153–208)	297 (245–361)	34 (29–40)	129 (114–148)	147 (131–166)	133 (119–151)	87 (18–395)	48 (37–62)	128 (111–147)
2000–01	48 (34–67)	168 (148–191)	225 (179–282)	52 (45–60)	91 (78–106)	257 (237–281)	53 (45–61)	136 (66–285)	81 (65–102)	113 (100–129)
2001–02	99 (78–127)	709 (651–775)	111 (82–148)	54 (46–62)	59 (50–71)	43 (36–51)	130 (117–145)	378 (218–665)	28 (22–36)	48 (40–57)
2002–03	81 (58–112)	188 (160–218)	80 (54–114)	77 (68–88)	54 (45–65)	89 (76–104)	197 (177–220)	83 (40–167)	63 (49–81)	96 (83–111)
2003–04	184 (129–260)	133 (111–159)	43 (29–64)	159 (143–178)	77 (66–89)	37 (32–44)	152 (131–174)	241 (130–445)	50 (41–62)	84 (72–98)
2004–05	28 (18–41)	122 (104–143)	54 (35–83)	137 (119–157)	56 (47–66)	43 (36–50)	170 (149–194)	39 (10–137)	173 (146–208)	63 (53–74)
2005–06	121 (90–158)	72 (60–86)	40 (25–61)	90 (80–102)	89 (78–102)	19 (16–22)	99 (88–112)	36 (15–83)	56 (47–67)	51 (44–60)
2006–07	77 (58–100)	53 (46–62)	26 (15–43)	92 (81–105)	48 (41–58)	33 (28–39)	67 (59–78)	26 (12–53)	43 (35–54)	34 (29–40)
2007–08	148 (119–185)	102 (88–116)	30 (19–47)	31 (27–36)	28 (23–35)	61 (53–70)	106 (95–117)	19 (4–89)	21 (17–27)	42 (37–49)
2008–09	37 (23–57)	42 (33–53)	58 (38–82)	18 (16–22)	39 (32–48)	62 (54–71)	69 (59–80)	20 (6–63)	8 (6–11)	43 (37–51)
2009–10	137 (105–176)	30 (24–36)	29 (18–44)	19 (16–22)	30 (24–38)	57 (50–64)	76 (67–87)	60 (12–271)	16 (12–23)	73 (63–83)
2010–11	3 (2–4)	40 (33–48)	25 (15–42)	28 (24–33)	40 (32–48)	47 (40–55)	61 (53–69)	25 (14–45)	51 (38–69)	46 (40–55)
2011–12	172 (139–214)	13 (11–17)	28 (16–46)	37 (32–41)	29 (23–36)	51 (45–58)	86 (76–98)	51 (23–111)	16 (12–21)	44 (37–51)
2012–13	79 (63–97)	27 (24–30)	39 (28–53)	30 (27–33)	32 (27–38)	42 (39–47)	74 (68–81)	45 (19–101)	9 (7–12)	58 (53–64)
2013–14	197 (167–233)	48 (42–54)	48 (36–62)	25 (23–28)	36 (30–44)	88 (81–96)	95 (87–103)	34 (23–51)	13 (11–17)	75 (68–83)
2014–15	63 (47–84)	44 (39–49)	72 (58–90)	40 (36–44)	38 (32–44)	75 (69–82)	105 (95–116)	63 (47–84)	27 (23–32)	87 (79–97)
2015–16	46 (35–60)	27 (23–30)	32 (23–44)	54 (48–60)	30 (25–37)	51 (46–57)	61 (54–68)	66 (43–103)	22 (18–27)	70 (62–78)
2016–17	115 (92–144)	24 (21–28)	11 (6–19)	54 (49–59)	23 (18–30)	15 (13–18)	65 (57–73)	88 (63–124)	20 (16–26)	59 (52–67)
slope	0.01	–0.03	–0.07	–0.06	–0.07	–0.03	0.02	0	–0.09	–0.01

	ONG	ETB	SOR	CSQ	SCH	DEA	FHD	SSI	SBW	SKA
1990–91	12 (4–35)	141 (117–168)	102 (89–116)	13 (8–21)	32 (23–44)	26 (21–32)	6 (5–8)	10 (8–13)	2 (1–4)	4 (2–8)
1991–92	109 (78–155)	97 (81–116)	47 (39–56)	18 (15–23)	32 (24–40)	19 (15–23)	21 (17–26)	34 (28–40)	10 (7–14)	21 (15–28)
1992–93	2 (0–22)	6 (2–15)	64 (44–93)	17 (11–27)	16 (11–24)	57 (46–70)	7 (5–11)	31 (25–39)	1 (1–2)	31 (21–44)
1993–94	33 (21–52)	1 (0–11)	31 (25–38)	6 (3–10)	11 (7–19)	39 (32–47)	8 (6–9)	7 (5–9)	2 (1–5)	13 (8–19)
1994–95	3 (0–26)	2 (0–23)	10 (7–14)	17 (11–26)	25 (16–39)	69 (55–86)	14 (11–18)	15 (12–19)	15 (11–22)	16 (12–21)
1995–96	2 (0–25)	2 (0–25)	13 (8–19)	13 (8–21)	31 (21–46)	43 (35–53)	21 (17–27)	13 (10–18)	2 (0–5)	28 (16–50)
1996–97	57 (32–99)	4 (0–40)	8 (4–13)	12 (5–27)	22 (11–47)	54 (42–71)	6 (5–8)	12 (8–17)	8 (4–16)	3 (1–7)
1997–98	58 (35–99)	42 (27–64)	94 (78–112)	10 (6–15)	50 (34–73)	236 (206–276)	25 (21–30)	120 (102–142)	71 (49–103)	139 (115–170)
1998–99	222 (174–280)	20 (14–30)	94 (76–114)	4 (2–8)	72 (54–96)	49 (39–62)	31 (27–36)	62 (53–72)	27 (17–41)	148 (126–177)
1999–00	568 (451–719)	14 (9–24)	198 (163–240)	32 (22–48)	67 (50–89)	91 (75–110)	23 (18–28)	15 (12–18)	25 (20–31)	185 (164–209)
2000–01	120 (94–152)	2 (0–15)	99 (80–123)	11 (5–20)	64 (50–83)	189 (166–215)	28 (24–32)	21 (17–25)	40 (31–52)	165 (144–188)
2001–02	377 (313–448)	1 (0–15)	187 (159–222)	2 (0–16)	68 (55–85)	10 (7–14)	84 (75–94)	55 (46–65)	17 (11–26)	136 (120–154)
2002–03	72 (45–109)	32 (22–45)	52 (40–68)	10 (4–26)	58 (45–74)	38 (30–47)	100 (91–110)	132 (116–149)	222 (175–280)	128 (111–147)
2003–04	8 (4–16)	44 (33–58)	44 (31–61)	4 (1–9)	64 (50–80)	27 (21–36)	95 (85–106)	60 (52–70)	75 (57–98)	4 (3–6)
2004–05	26 (16–41)	8 (3–19)	46 (35–59)	25 (14–44)	32 (23–42)	12 (9–17)	77 (69–85)	63 (55–73)	27 (11–61)	2 (1–3)
2005–06	16 (12–22)	13 (9–19)	19 (14–25)	87 (67–111)	37 (28–46)	25 (20–32)	54 (49–60)	31 (26–36)	4 (2–7)	<1 (0–1)
2006–07	10 (5–17)	43 (32–58)	57 (45–71)	31 (23–42)	34 (26–45)	22 (17–29)	46 (41–52)	45 (39–52)	25 (16–41)	<1 (0–4)
2007–08	26 (20–35)	166 (143–189)	150 (130–172)	121 (104–142)	35 (27–44)	18 (13–25)	36 (32–40)	44 (38–50)	117 (94–146)	<1 (0–1)
2008–09	4 (3–6)	69 (57–83)	37 (30–48)	68 (54–85)	28 (22–36)	28 (21–36)	21 (18–24)	40 (35–45)	81 (62–105)	<1 (0–3)
2009–10	8 (6–12)	167 (143–192)	22 (16–30)	44 (35–55)	52 (43–63)	7 (5–11)	39 (35–43)	22 (19–25)	14 (8–23)	<1 (0–3)
2010–11	6 (4–9)	75 (65–87)	34 (27–43)	54 (44–67)	48 (37–62)	5 (3–7)	54 (49–60)	24 (21–29)	38 (29–48)	<1 (0–3)
2011–12	5 (3–9)	91 (78–107)	44 (35–56)	75 (62–91)	50 (41–60)	10 (7–14)	25 (22–28)	31 (27–35)	20 (14–28)	<1 (0–2)
2012–13	14 (11–19)	157 (144–172)	22 (19–27)	105 (92–120)	59 (50–69)	8 (6–10)	50 (46–54)	34 (31–37)	23 (19–29)	<1 (0–2)
2013–14	4 (3–6)	171 (156–187)	47 (40–55)	163 (145–186)	51 (41–63)	7 (5–9)	34 (32–37)	31 (28–34)	75 (63–89)	<1 (0–2)
2014–15	8 (5–12)	97 (83–112)	19 (16–24)	119 (105–136)	63 (55–73)	8 (7–11)	84 (78–91)	41 (37–45)	55 (46–66)	<1 (0–2)
2015–16	6 (3–9)	69 (61–79)	36 (30–44)	181 (161–203)	63 (53–75)	6 (4–8)	52 (48–57)	31 (28–34)	49 (40–62)	<1 (0–2)
2016–17	24 (18–31)	184 (163–207)	17 (13–22)	135 (119–153)	67 (57–79)	8 (5–10)	70 (65–75)	62 (56–69)	35 (29–43)	<1 (0–2)
slope	–0.05	0.13	–0.02	0.12	0.03	–0.09	0.07	0.03	0.1	–0.3

	BBE	CON	ETM	TOA	SWO	BYX	RSK	BYS	BEN	ORH
1990–91	18 (14–23)	23 (18–29)	5 (2–11)	5 (4–6)	25 (11–53)	23 (18–29)	11 (7–16)	2 (1–4)	4 (2–6)	46 (37–58)
1991–92	24 (18–32)	12 (9–15)	88 (68–114)	7 (5–10)	14 (3–51)	25 (21–31)	11 (8–16)	2 (1–4)	<1 (0–2)	32 (24–43)
1992–93	30 (23–39)	13 (10–18)	28 (20–38)	5 (3–7)	13 (3–41)	28 (23–36)	13 (8–19)	1 (0–2)	<1 (0–4)	24 (15–39)
1993–94	5 (4–6)	7 (5–10)	8 (6–10)	1 (1–2)	12 (4–41)	61 (50–75)	7 (4–11)	9 (6–18)	<1 (0–3)	17 (11–26)
1994–95	22 (16–29)	2 (1–4)	235 (201–283)	4 (3–6)	8 (1–39)	49 (40–60)	9 (5–15)	11 (4–29)	25 (9–66)	20 (11–36)
1995–96	40 (32–50)	11 (8–16)	32 (21–48)	7 (5–10)	7 (1–33)	56 (43–73)	2 (1–7)	7 (4–14)	14 (8–23)	2 (1–5)
1996–97	13 (10–18)	18 (14–25)	69 (41–113)	18 (14–25)	23 (6–85)	53 (39–72)	2 (0–10)	4 (2–11)	1 (0–5)	12 (4–33)
1997–98	31 (26–38)	22 (17–28)	7 (4–12)	34 (29–41)	60 (30–119)	126 (104–153)	30 (19–44)	2 (1–5)	1 (0–6)	9 (5–14)
1998–99	48 (41–55)	15 (12–20)	108 (89–133)	37 (31–45)	65 (39–105)	9 (6–14)	32 (24–42)	17 (11–27)	18 (11–27)	13 (8–23)
1999–00	30 (25–37)	17 (13–23)	144 (119–175)	39 (33–47)	79 (50–126)	15 (10–21)	2 (1–6)	35 (25–54)	63 (51–77)	102 (77–135)
2000–01	36 (30–42)	21 (17–26)	16 (11–22)	50 (42–59)	103 (64–162)	13 (9–19)	3 (1–5)	73 (55–108)	58 (46–73)	8 (5–13)
2001–02	74 (65–84)	91 (79–107)	26 (16–41)	43 (38–50)	11 (4–29)	1 (1–3)	4 (2–8)	7 (5–11)	18 (14–24)	42 (31–58)
2002–03	69 (60–79)	56 (47–66)	1 (0–3)	81 (72–92)	29 (12–70)	21 (16–29)	5 (2–10)	36 (25–55)	55 (46–66)	84 (65–108)
2003–04	83 (71–97)	42 (35–50)	39 (26–58)	64 (55–74)	13 (4–36)	5 (3–8)	109 (91–131)	42 (31–65)	67 (57–77)	36 (23–54)
2004–05	50 (44–57)	31 (26–37)	2 (1–5)	68 (58–80)	9 (2–26)	2 (1–5)	45 (35–57)	14 (10–22)	38 (33–44)	15 (8–29)
2005–06	23 (19–27)	15 (12–18)	30 (21–40)	42 (37–48)	4 (1–18)	1 (0–2)	44 (35–53)	11 (9–16)	55 (47–65)	14 (9–21)
2006–07	54 (46–63)	12 (9–16)	29 (21–39)	19 (15–22)	10 (3–27)	8 (5–13)	17 (12–23)	31 (23–47)	9 (6–12)	23 (14–36)
2007–08	13 (11–15)	78 (66–91)	3 (2–5)	23 (20–27)	16 (7–38)	8 (5–13)	27 (22–33)	29 (21–45)	7 (5–8)	59 (47–75)
2008–09	27 (22–34)	25 (20–31)	<1 (0–1)	14 (11–18)	18 (8–39)	7 (4–12)	25 (20–31)	31 (22–49)	13 (11–16)	23 (15–35)
2009–10	41 (35–47)	38 (32–44)	<1 (0–1)	22 (19–26)	10 (3–28)	7 (4–10)	33 (28–40)	69 (50–107)	12 (10–15)	7 (4–11)
2010–11	45 (39–52)	40 (34–47)	<1 (0–4)	23 (19–27)	14 (4–37)	9 (5–16)	29 (23–37)	32 (22–52)	5 (4–7)	4 (2–7)
2011–12	12 (10–14)	17 (14–20)	<1 (0–4)	15 (13–18)	24 (11–46)	10 (7–15)	22 (18–28)	14 (10–22)	10 (8–12)	1 (1–2)
2012–13	38 (35–41)	54 (49–61)	5 (1–12)	19 (17–22)	37 (24–57)	15 (12–19)	38 (33–44)	23 (17–35)	14 (13–15)	2 (1–4)
2013–14	33 (30–37)	81 (71–91)	3 (1–6)	24 (21–28)	21 (12–35)	27 (22–35)	33 (28–40)	66 (44–108)	36 (33–39)	6 (4–9)
2014–15	76 (70–84)	117 (106–130)	<1 (0–4)	38 (34–43)	22 (12–40)	48 (42–56)	50 (43–59)	24 (17–36)	29 (27–32)	7 (5–11)
2015–16	48 (43–53)	40 (34–46)	<1 (0–1)	10 (8–12)	40 (24–64)	24 (20–30)	35 (30–42)	37 (28–57)	45 (41–50)	4 (2–6)
2016–17	30 (26–33)	58 (51–67)	<1 (0–1)	20 (17–24)	14 (6–28)	35 (29–43)	42 (36–50)	14 (9–24)	20 (17–23)	5 (3–8)
slope	0.03	0.07	–0.25	0.05	0	–0.04	0.08	0.1	0.13	–0.07

Ling longline fishery

- Of the 131 bycatch species examined, 14 showed a decrease in catch over time and one was significant; 83 showed an increase and 34 were significant
- Species showing the greatest decline were unspecified skates (SKA), Antarctic rock cod (Nototheniidae, NOT*), and conger eel (*Conger* spp., CON) (Figure 17)
- Species showing the greatest increase were hairy conger (*Bassanago hirsutus*, HCO), hoki (*Hoplostethus medius*, HOK), and swollenhead conger (*Bassanago bulbiceps*, SCO) (Figure 17)
- Most common bycatch species by weight (t) were spiny dogfish (SPD), ribaldo (*Mora moro*, RIB), and smooth skate (*Dipturus innominatus*, SSK) (Figure 18).
- * Trend not significant

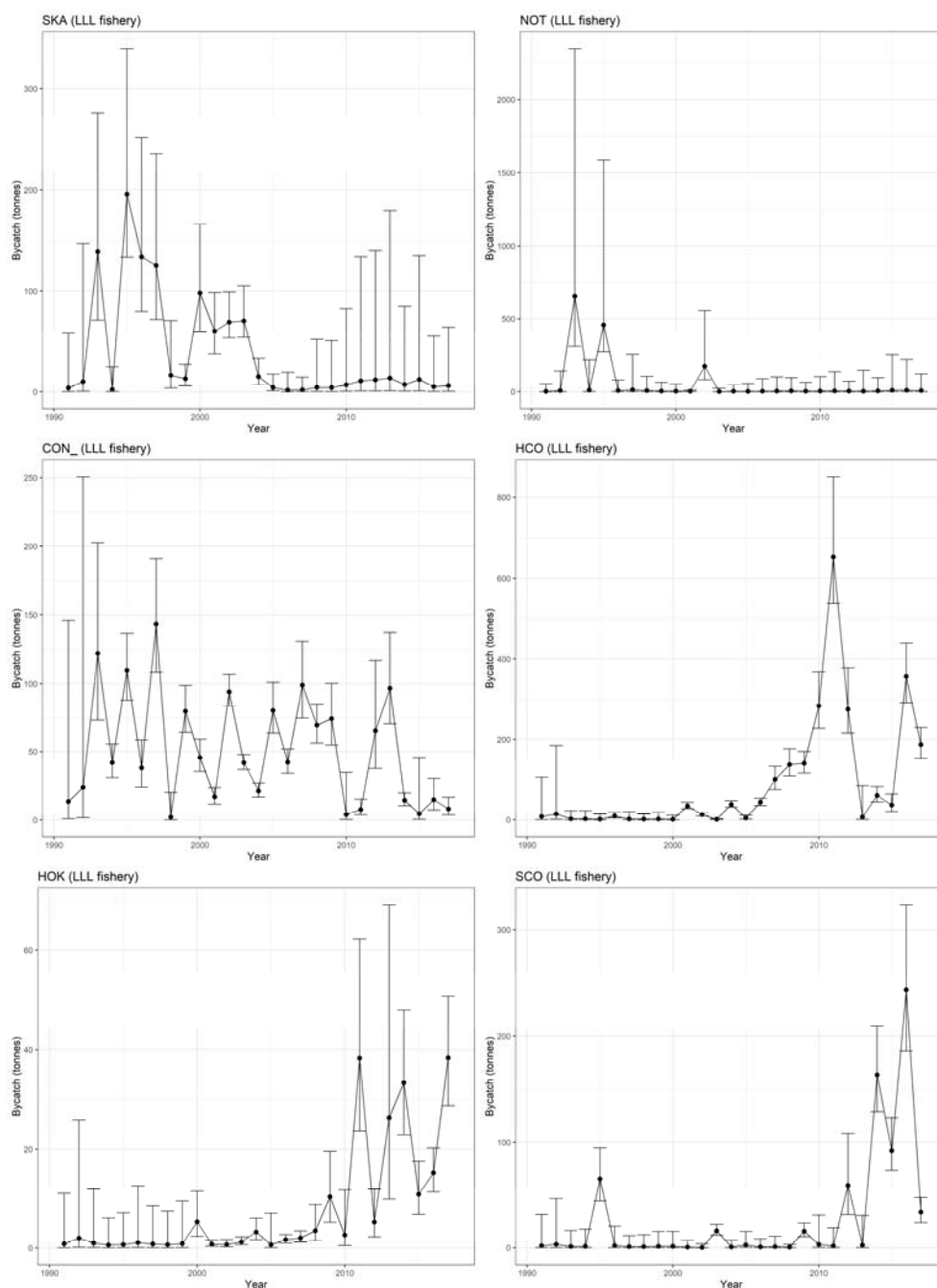


Figure 17: Annual bycatch estimates in the ling longline fishery for the species showing the greatest increases and declines between 1990–91 and 2016–17. See text above for explanation of the species codes. Note: the scale changes on the y-axis between plots.

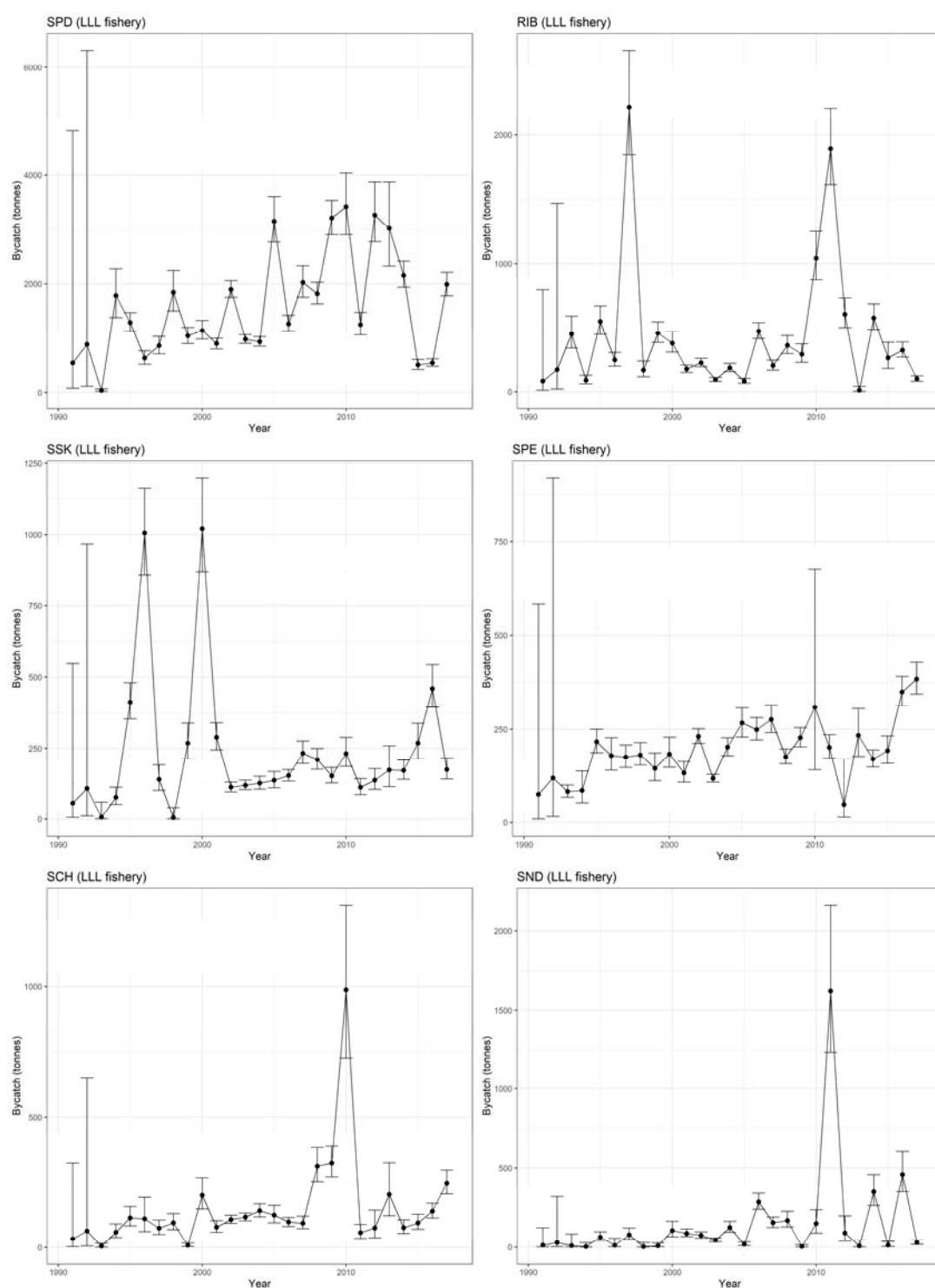


Figure 18: Annual bycatch estimates for the most common ling longline fishery bycatch species by weight between 1990–91 and 2016–17. See <http://marlin.niwa.co.nz> or Table 10 for species code definitions. Note: the scale changes on the y-axis between plots. SPD, SPE, SCH, and SND all had significant increasing trends, SSK with an increasing non-significant trend, and RIB showed no trend.

Table 8: Ling longline fishery. Total annual bycatch estimates (t) (with estimated 95% CIs) and slope of the regression for the top 50 individual species in this fishery (see <http://marlin.niwa.co.nz> for species code definitions). Species are ordered by decreasing total catch.

	SPD	RIB	SSK	SPE	SCH	SND	RSK	BNS	RCO	HCO
1990–91	563 (77–4114)	87 (10–750)	58 (6–527)	74 (9–535)	33 (3–354)	11 (1–131)	17 (1–169)	12 (1–126)	18 (2–171)	7 (1–95)
1991–92	893 (121–6515)	181 (21–1516)	111 (10–990)	121 (16–913)	63 (5–645)	31 (2–330)	51 (5–478)	30 (2–304)	41 (4–354)	15 (1–205)
1992–93	39 (22–66)	453 (348–594)	7 (1–65)	83 (67–102)	5 (1–17)	9 (1–99)	7 (1–64)	2093 (1588–2854)	51 (35–73)	2 (0–24)
1993–94	1787 (1389–2293)	94 (65–134)	77 (52–114)	86 (55–138)	59 (37–88)	2 (0–24)	46 (4–432)	48 (30–78)	27 (19–36)	2 (0–21)
1994–95	1300 (1153–1476)	552 (452–671)	412 (355–478)	216 (186–250)	113 (81–159)	63 (41–100)	4 (0–39)	6 (1–32)	40 (30–54)	1 (0–15)
1995–96	643 (536–779)	252 (203–310)	1001 (865–1163)	180 (141–230)	111 (61–196)	10 (2–57)	3 (0–30)	48 (18–121)	89 (69–117)	9 (5–18)
1996–97	873 (726–1048)	2226 (1866–2651)	140 (102–191)	175 (148–209)	73 (51–105)	78 (50–122)	35 (3–302)	160 (68–374)	41 (20–85)	2 (0–16)
1997–98	1846 (1494–2262)	174 (123–246)	5 (1–41)	182 (155–213)	95 (69–132)	3 (0–29)	269 (209–342)	140 (95–206)	18 (13–24)	1 (0–14)
1998–99	1054 (914–1207)	460 (387–546)	269 (211–341)	145 (111–186)	8 (4–16)	8 (2–29)	28 (20–37)	30 (10–81)	12 (7–21)	2 (0–17)
1999–00	1154 (999–1329)	383 (311–471)	1019 (863–1200)	184 (146–233)	199 (148–266)	105 (66–165)	2 (0–6)	22 (12–38)	184 (151–225)	1 (0–12)
2000–01	913 (817–1018)	182 (156–215)	289 (248–339)	133 (108–163)	77 (58–102)	87 (66–114)	11 (6–18)	14 (8–24)	63 (53–75)	34 (27–43)
2001–02	1902 (1760–2060)	230 (200–263)	112 (96–131)	231 (211–251)	107 (92–123)	76 (59–98)	5 (2–10)	11 (7–18)	239 (217–263)	13 (10–16)
2002–03	993 (916–1078)	100 (85–116)	119 (104–137)	118 (108–129)	116 (102–132)	45 (33–58)	200 (172–232)	24 (17–34)	126 (116–138)	1 (1–2)
2003–04	947 (861–1037)	190 (160–226)	126 (106–150)	202 (179–227)	140 (117–166)	124 (94–163)	529 (460–604)	21 (15–30)	136 (121–152)	38 (31–47)
2004–05	3165 (2799–3591)	88 (71–109)	136 (111–168)	267 (231–309)	123 (93–161)	18 (10–31)	52 (41–67)	54 (39–76)	66 (54–80)	4 (2–12)
2005–06	1275 (1146–1431)	476 (414–546)	153 (136–174)	249 (222–279)	97 (81–115)	284 (240–336)	63 (35–116)	31 (23–41)	81 (71–91)	44 (35–54)
2006–07	2033 (1771–2318)	209 (174–251)	233 (198–276)	277 (243–318)	93 (71–121)	154 (124–191)	213 (163–281)	59 (46–76)	95 (79–114)	99 (74–132)
2007–08	1819 (1646–2018)	366 (300–442)	210 (177–250)	176 (157–198)	313 (255–386)	168 (125–220)	544 (468–640)	94 (63–142)	69 (56–86)	136 (106–176)
2008–09	3227 (2927–3566)	298 (235–379)	152 (127–183)	227 (201–254)	323 (270–388)	5 (1–16)	77 (62–96)	123 (70–213)	93 (78–110)	139 (116–170)
2009–10	3446 (2917–4021)	1050 (879–1254)	231 (185–284)	311 (142–681)	988 (731–1309)	147 (90–234)	9 (5–14)	16 (5–45)	62 (46–81)	283 (225–367)
2010–11	1262 (1079–1478)	1890 (1607–2228)	111 (86–144)	201 (170–234)	57 (35–89)	1627 (1227–2146)	20 (14–28)	124 (62–250)	12 (6–21)	651 (536–838)
2011–12	3271 (2770–3840)	606 (502–730)	137 (104–179)	47 (14–159)	74 (37–150)	91 (40–200)	7 (5–9)	38 (15–90)	32 (20–49)	275 (213–379)
2012–13	3017 (2316–3889)	11 (3–45)	173 (115–258)	234 (178–303)	200 (123–321)	7 (1–42)	3 (0–21)	26 (2–247)	519 (384–701)	7 (1–70)
2013–14	2168 (1928–2416)	580 (484–690)	170 (138–208)	169 (148–195)	75 (54–106)	347 (259–460)	124 (102–152)	134 (90–195)	60 (50–73)	60 (43–82)
2014–15	517 (429–616)	266 (185–384)	267 (212–337)	192 (158–233)	94 (70–128)	12 (4–38)	122 (64–219)	48 (28–81)	184 (145–234)	37 (21–65)
2015–16	558 (494–630)	329 (273–392)	458 (393–538)	349 (313–392)	138 (112–170)	462 (350–608)	313 (220–447)	74 (51–104)	44 (35–56)	358 (290–443)
2016–17	1992 (1781–2235)	106 (85–131)	175 (141–215)	383 (344–428)	246 (201–297)	28 (18–44)	950 (810–1118)	65 (47–90)	98 (84–115)	187 (153–230)
slope	0.05	0	0.04	0.03	0.06	0.09	0.08	0.01	0.04	0.19

	BCD	GSH	BAS	BSH	GSP	NOT	HAK	CON	SHA	CSQ
1990–91	7 (0–74)	26 (3–221)	8 (1–84)	10 (1–117)	12 (1–111)	2 (0–61)	15 (1–155)	13 (1–136)	8 (1–96)	2 (0–32)
1991–92	19 (1–207)	41 (4–351)	27 (2–245)	27 (2–285)	32 (3–303)	7 (0–154)	27 (2–248)	24 (2–272)	22 (2–251)	8 (0–96)
1992–93	3 (0–35)	52 (41–67)	24 (2–220)	19 (7–55)	9 (5–15)	670 (309–2206)	14 (7–29)	124 (75–204)	3 (0–31)	5 (0–60)
1993–94	36 (3–401)	30 (22–43)	27 (2–226)	3 (0–32)	14 (1–122)	11 (0–194)	5 (1–27)	42 (30–56)	33 (24–46)	2 (0–19)
1994–95	43 (23–81)	108 (93–125)	39 (12–127)	68 (46–99)	2 (0–17)	471 (275–1489)	15 (7–34)	110 (87–137)	279 (195–391)	4 (0–50)
1995–96	194 (147–261)	186 (153–227)	27 (5–133)	53 (40–70)	1 (0–11)	7 (0–73)	40 (18–83)	38 (24–60)	8 (5–13)	8 (1–49)
1996–97	25 (2–255)	55 (44–68)	104 (42–260)	14 (7–30)	4 (0–33)	12 (0–245)	26 (13–52)	143 (109–192)	65 (33–122)	9 (1–121)
1997–98	4 (0–41)	60 (49–73)	117 (57–237)	27 (15–51)	3 (0–25)	7 (0–100)	16 (7–34)	2 (0–20)	2 (0–23)	8 (1–98)
1998–99	<1 (0–2)	9 (6–12)	77 (46–131)	18 (11–30)	37 (28–50)	4 (0–70)	54 (30–94)	80 (64–100)	47 (28–80)	10 (1–102)
1999–00	162 (132–201)	89 (63–127)	11 (1–97)	15 (7–32)	26 (19–36)	3 (0–49)	21 (9–46)	46 (36–60)	30 (21–42)	49 (23–109)
2000–01	30 (22–41)	12 (8–19)	34 (19–59)	70 (52–93)	34 (30–39)	3 (1–11)	23 (13–42)	17 (12–24)	82 (66–101)	1 (0–10)
2001–02	2 (0–27)	62 (55–70)	29 (15–56)	48 (39–60)	123 (109–139)	174 (83–556)	22 (14–32)	94 (83–107)	58 (45–75)	2 (0–27)
2002–03	105 (89–145)	42 (36–48)	47 (30–71)	54 (44–67)	68 (60–76)	1 (0–25)	19 (12–29)	42 (37–48)	18 (15–21)	2 (0–23)
2003–04	301 (253–419)	29 (23–36)	41 (21–79)	46 (34–62)	65 (55–76)	3 (0–51)	15 (9–24)	21 (17–27)	61 (50–74)	7 (5–11)
2004–05	37 (21–67)	159 (126–199)	38 (20–70)	40 (27–57)	70 (57–85)	2 (0–57)	22 (10–42)	81 (64–100)	68 (53–87)	3 (0–30)
2005–06	7 (1–81)	52 (45–61)	25 (16–40)	111 (94–130)	38 (32–44)	4 (0–96)	14 (8–23)	42 (34–51)	18 (14–23)	5 (0–56)
2006–07	7 (1–81)	109 (86–137)	15 (10–23)	115 (90–147)	46 (37–57)	3 (0–96)	18 (10–33)	99 (75–131)	31 (25–39)	56 (39–88)
2007–08	311 (232–646)	61 (49–77)	33 (15–67)	71 (49–98)	161 (136–190)	5 (0–81)	32 (18–53)	69 (57–86)	59 (42–81)	24 (12–47)
2008–09	266 (182–408)	94 (80–111)	32 (11–94)	55 (39–79)	100 (86–117)	3 (0–69)	142 (100–202)	74 (55–101)	88 (71–111)	2 (0–27)
2009–10	2 (0–20)	134 (90–197)	52 (5–485)	202 (151–266)	38 (30–48)	4 (0–104)	51 (17–137)	4 (0–35)	52 (37–73)	29 (13–79)
2010–11	1 (0–2)	11 (7–17)	359 (150–841)	184 (132–255)	73 (59–90)	6 (0–143)	198 (127–308)	8 (4–15)	172 (121–248)	796 (426–1765)
2011–12	<1 (0–0)	28 (3–228)	70 (21–264)	104 (77–144)	103 (85–128)	3 (0–92)	167 (116–243)	66 (37–118)	54 (42–72)	101 (53–210)
2012–13	1 (0–22)	49 (37–65)	121 (30–520)	19 (8–45)	2 (0–24)	4 (0–160)	35 (15–77)	97 (70–136)	6 (1–55)	13 (1–130)
2013–14	1 (0–2)	98 (69–136)	116 (52–246)	189 (149–240)	75 (62–90)	5 (0–112)	173 (130–235)	14 (10–20)	32 (22–47)	53 (29–101)
2014–15	21 (2–218)	140 (113–175)	142 (52–374)	8 (3–22)	15 (8–25)	10 (0–250)	101 (78–130)	5 (0–46)	7 (4–13)	8 (1–37)
2015–16	26 (2–269)	174 (147–204)	37 (19–68)	20 (11–35)	300 (257–354)	11 (0–223)	40 (26–58)	15 (7–31)	30 (23–39)	80 (40–160)
2016–17	674 (504–1440)	103 (83–128)	24 (13–42)	60 (42–83)	197 (164–234)	6 (0–144)	103 (76–142)	8 (4–16)	41 (33–52)	13 (6–24)
slope	–0.02	0.03	0.04	0.06	0.1	–0.06	0.08	–0.04	0.03	0.1

	SKA	HAP	NSD	HAG	CAR	SCO	ETM	DWE	PLS	RAT
1990–91	4 (0–69)	7 (1–99)	5 (0–67)	5 (0–55)	6 (0–75)	2 (0–31)	1 (0–12)	3 (0–42)	1 (0–14)	3 (0–28)
1991–92	10 (1–156)	18 (1–214)	10 (1–127)	10 (1–96)	11 (1–139)	3 (0–56)	3 (0–39)	5 (0–68)	2 (0–31)	7 (1–59)
1992–93	138 (71–289)	117 (72–191)	3 (0–41)	1 (0–13)	3 (0–28)	1 (0–15)	1 (0–14)	3 (0–50)	1 (0–12)	1 (0–6)
1993–94	2 (0–29)	3 (0–28)	8 (1–89)	32 (23–45)	6 (0–66)	1 (0–17)	2 (0–21)	5 (0–79)	1 (0–14)	3 (1–11)
1994–95	196 (133–357)	15 (6–36)	2 (0–23)	1 (0–5)	2 (0–19)	65 (45–95)	1 (0–11)	3 (0–35)	1 (0–10)	9 (6–13)
1995–96	134 (78–252)	14 (3–59)	8 (1–91)	2 (0–9)	3 (0–34)	2 (0–24)	1 (0–9)	4 (0–67)	1 (0–10)	8 (5–12)
1996–97	124 (71–257)	38 (16–89)	126 (36–370)	18 (10–34)	9 (2–35)	1 (0–12)	1 (0–19)	3 (0–48)	41 (21–78)	3 (1–11)
1997–98	17 (4–73)	38 (24–60)	3 (0–37)	2 (1–5)	1 (0–5)	1 (0–11)	1 (0–15)	205 (135–406)	1 (0–13)	1 (0–6)
1998–99	13 (6–28)	4 (0–35)	4 (0–48)	2 (0–6)	44 (17–112)	1 (0–15)	240 (194–303)	12 (1–84)	1 (0–10)	6 (4–7)
1999–00	97 (59–172)	31 (18–52)	4 (0–47)	4 (2–9)	2 (0–23)	1 (0–14)	34 (24–49)	3 (0–53)	<1 (0–6)	16 (13–19)
2000–01	60 (36–102)	27 (19–41)	9 (1–52)	9 (7–12)	28 (12–61)	1 (0–8)	37 (29–48)	4 (0–65)	<1 (0–4)	11 (9–12)
2001–02	69 (54–101)	21 (15–29)	15 (9–28)	16 (14–19)	2 (1–4)	<1 (0–4)	38 (24–61)	3 (1–12)	<1 (0–5)	22 (20–25)
2002–03	70 (53–108)	31 (24–42)	23 (13–45)	22 (19–25)	20 (13–31)	16 (12–22)	16 (10–26)	1 (0–14)	<1 (0–2)	18 (16–21)
2003–04	15 (7–34)	19 (13–28)	156 (76–338)	19 (15–24)	2 (1–7)	1 (0–8)	<1 (0–3)	22 (9–81)	8 (5–15)	26 (23–30)
2004–05	4 (1–18)	18 (10–34)	147 (103–220)	54 (44–67)	50 (30–82)	3 (0–16)	<1 (0–5)	4 (0–50)	1 (0–6)	9 (7–12)
2005–06	2 (0–18)	23 (17–30)	57 (33–101)	15 (13–18)	30 (21–44)	1 (0–9)	1 (1–2)	2 (0–24)	1 (0–8)	12 (10–14)
2006–07	2 (0–16)	44 (32–60)	38 (22–68)	58 (48–70)	153 (102–234)	1 (0–13)	61 (28–130)	34 (19–77)	11 (4–29)	19 (15–24)
2007–08	4 (0–56)	65 (43–99)	29 (11–69)	41 (34–49)	105 (64–172)	1 (0–3)	1 (0–9)	5 (0–83)	1 (0–9)	14 (11–17)
2008–09	4 (0–52)	48 (34–72)	38 (12–101)	32 (26–39)	9 (4–22)	16 (11–23)	<1 (0–5)	4 (0–59)	1 (0–8)	18 (15–23)
2009–10	7 (1–78)	99 (63–156)	20 (3–140)	235 (173–320)	26 (6–99)	3 (0–42)	1 (0–10)	9 (0–138)	2 (0–12)	19 (13–26)
2010–11	11 (1–137)	28 (14–55)	11 (2–69)	43 (32–60)	95 (53–170)	2 (0–22)	1 (0–9)	7 (0–87)	110 (67–220)	4 (3–6)
2011–12	11 (1–160)	9 (2–35)	96 (37–250)	10 (2–41)	4 (1–12)	59 (31–111)	1 (0–8)	3 (0–33)	9 (5–21)	1 (1–2)
2012–13	13 (1–183)	128 (55–292)	56 (29–103)	81 (58–112)	32 (15–64)	3 (0–34)	<1 (0–7)	5 (0–71)	2 (0–23)	1 (0–3)
2013–14	7 (1–82)	48 (28–85)	6 (1–33)	50 (39–64)	44 (27–73)	163 (129–210)	1 (0–8)	88 (41–227)	118 (68–219)	9 (7–12)
2014–15	12 (1–148)	33 (19–58)	28 (11–70)	51 (39–68)	10 (5–18)	92 (74–123)	32 (15–73)	2 (0–25)	3 (0–18)	16 (12–23)
2015–16	5 (0–62)	48 (33–71)	12 (4–33)	15 (11–19)	14 (8–26)	243 (186–324)	1 (0–10)	3 (0–40)	109 (79–179)	18 (15–22)
2016–17	6 (1–71)	33 (21–51)	38 (21–69)	34 (26–43)	45 (31–65)	34 (24–48)	1 (0–10)	3 (0–40)	3 (1–9)	134 (113–160)
slope	–0.08	0.05	0.07	0.12	0.09	0.13	–0.04	0.01	0.11	0.06

	HPB	ETL	ASR	HOK	BWS	ETB	RBM	SEE	RSO	HEX
1990–91	2 (0–26)	2 (0–28)	1 (0–14)	1 (0–11)	1 (0–28)	1 (0–14)	1 (0–14)	<1 (0–6)	2 (0–21)	1 (0–12)
1991–92	3 (0–52)	4 (0–44)	2 (0–28)	2 (0–25)	3 (0–59)	2 (0–39)	2 (0–26)	<1 (0–9)	3 (0–35)	1 (0–22)
1992–93	1 (0–19)	1 (0–5)	<1 (0–3)	1 (0–11)	2 (0–30)	1 (0–21)	56 (39–82)	<1 (0–5)	3 (0–33)	<1 (0–6)
1993–94	31 (12–91)	1 (0–7)	<1 (0–5)	1 (0–6)	3 (0–41)	3 (0–38)	1 (0–6)	1 (0–12)	2 (0–30)	1 (0–23)
1994–95	10 (4–29)	25 (17–35)	<1 (0–2)	1 (0–8)	2 (0–20)	1 (0–15)	3 (2–6)	<1 (0–3)	3 (0–33)	<1 (0–4)
1995–96	16 (5–45)	54 (22–128)	<1 (0–3)	1 (0–11)	7 (1–35)	1 (0–11)	2 (0–4)	<1 (0–7)	3 (0–40)	1 (0–9)
1996–97	20 (7–54)	19 (11–31)	<1 (0–3)	1 (0–10)	17 (6–50)	3 (0–41)	31 (18–51)	<1 (0–4)	4 (0–46)	<1 (0–2)
1997–98	10 (4–24)	3 (1–6)	<1 (0–3)	1 (0–7)	2 (0–20)	2 (0–25)	<1 (0–3)	<1 (0–4)	3 (0–36)	<1 (0–4)
1998–99	2 (0–19)	3 (2–4)	11 (8–16)	1 (0–10)	14 (3–64)	1 (0–13)	13 (9–18)	<1 (0–4)	3 (0–31)	<1 (0–5)
1999–00	1 (0–16)	13 (9–20)	10 (6–14)	5 (2–12)	24 (5–107)	1 (0–10)	14 (8–22)	<1 (0–6)	12 (3–45)	1 (0–9)
2000–01	1 (0–6)	1 (0–1)	13 (10–16)	1 (0–2)	10 (5–26)	4 (1–13)	3 (2–5)	<1 (0–7)	1 (0–17)	1 (0–11)
2001–02	3 (1–6)	7 (6–9)	29 (25–33)	1 (0–2)	4 (1–13)	18 (11–28)	3 (2–5)	<1 (0–2)	3 (0–19)	4 (3–7)
2002–03	<1 (0–2)	3 (2–4)	37 (33–43)	1 (1–2)	6 (2–17)	2 (0–13)	1 (1–2)	<1 (0–1)	1 (0–7)	2 (1–3)
2003–04	2 (1–6)	5 (4–8)	50 (42–59)	3 (2–6)	4 (1–19)	15 (7–31)	2 (1–4)	<1 (0–4)	1 (0–6)	3 (1–9)
2004–05	2 (0–19)	15 (12–19)	6 (4–9)	1 (0–7)	9 (2–42)	<1 (0–2)	3 (1–5)	103 (75–178)	4 (1–17)	52 (34–86)
2005–06	1 (0–8)	4 (3–6)	8 (5–11)	2 (1–3)	2 (1–5)	<1 (0–8)	4 (3–6)	6 (3–12)	7 (2–21)	1 (0–4)
2006–07	14 (6–31)	3 (2–5)	4 (3–7)	2 (1–3)	4 (1–11)	1 (0–8)	1 (0–3)	<1 (0–8)	4 (1–14)	1 (0–8)
2007–08	27 (10–73)	5 (3–7)	<1 (0–1)	4 (1–9)	5 (1–23)	17 (5–50)	<1 (0–2)	1 (0–3)	4 (0–47)	8 (3–20)
2008–09	1 (0–18)	1 (0–3)	9 (7–11)	10 (6–19)	2 (0–23)	1 (0–6)	1 (0–3)	44 (29–79)	5 (0–58)	10 (4–25)
2009–10	3 (0–34)	11 (7–16)	6 (3–13)	3 (1–12)	5 (0–74)	2 (0–9)	7 (3–15)	1 (0–20)	4 (0–46)	2 (0–34)
2010–11	3 (0–32)	21 (17–30)	4 (3–5)	38 (24–62)	4 (1–28)	15 (5–41)	2 (1–5)	1 (0–2)	6 (0–73)	1 (0–5)
2011–12	3 (0–34)	7 (5–9)	4 (2–8)	5 (2–12)	3 (0–42)	4 (2–11)	1 (0–5)	1 (0–16)	2 (1–5)	2 (0–25)
2012–13	3 (0–45)	3 (1–6)	1 (0–3)	27 (10–71)	10 (1–69)	1 (0–11)	1 (0–7)	1 (0–12)	2 (0–30)	3 (1–12)
2013–14	10 (3–28)	32 (25–42)	1 (1–2)	33 (23–47)	23 (10–57)	30 (15–57)	7 (4–11)	<1 (0–7)	5 (0–58)	<1 (0–2)
2014–15	3 (1–12)	7 (5–10)	3 (2–4)	11 (7–17)	4 (1–27)	8 (2–52)	2 (1–3)	<1 (0–8)	2 (1–4)	7 (3–16)
2015–16	31 (17–56)	21 (17–27)	7 (6–9)	15 (12–20)	13 (5–31)	38 (15–103)	3 (2–6)	<1 (0–5)	6 (2–14)	16 (9–30)
2016–17	84 (60–120)	3 (2–5)	4 (3–6)	38 (29–50)	19 (7–52)	1 (0–12)	3 (2–5)	<1 (0–5)	56 (35–91)	2 (1–4)
slope	0.03	0.03	0.1	0.14	0.04	0.06	–0.03	0.06	0.04	0.1

	POS	CHI	NMP	SEV	CHG	GIZ	CYO	CYP	MAK	SCM
1990–91	1 (0–18)	<1 (0–7)	1 (0–10)	<1 (0–7)	<1 (0–6)	<1 (0–4)	<1 (0–3)	<1 (0–4)	<1 (0–5)	<1 (0–4)
1991–92	2 (0–43)	1 (0–21)	1 (0–19)	1 (0–18)	1 (0–16)	1 (0–9)	<1 (0–6)	<1 (0–9)	<1 (0–11)	<1 (0–11)
1992–93	2 (0–24)	1 (0–13)	1 (0–16)	1 (0–14)	1 (0–13)	<1 (0–4)	<1 (0–6)	<1 (0–9)	<1 (0–10)	<1 (0–10)
1993–94	2 (0–30)	2 (0–28)	1 (0–10)	1 (0–15)	1 (0–23)	<1 (0–2)	<1 (0–7)	<1 (0–5)	<1 (0–11)	<1 (0–12)
1994–95	3 (0–27)	1 (0–9)	1 (0–16)	1 (0–11)	1 (0–10)	<1 (0–4)	<1 (0–5)	<1 (0–8)	<1 (0–10)	<1 (0–9)
1995–96	3 (0–18)	1 (0–10)	1 (0–17)	1 (0–14)	1 (0–9)	<1 (0–2)	<1 (0–5)	1 (0–10)	<1 (0–11)	<1 (0–6)
1996–97	7 (1–43)	2 (0–42)	3 (0–27)	1 (0–12)	2 (0–33)	1 (0–8)	<1 (0–9)	1 (0–15)	1 (0–12)	1 (0–15)
1997–98	3 (0–23)	1 (0–16)	1 (0–14)	1 (0–13)	1 (0–15)	<1 (0–3)	<1 (0–6)	1 (0–11)	1 (0–12)	<1 (0–10)
1998–99	4 (1–16)	51 (35–124)	1 (0–15)	1 (0–11)	1 (0–4)	<1 (0–2)	35 (19–119)	1 (0–12)	1 (0–12)	2 (0–9)
1999–00	11 (3–34)	<1 (0–7)	1 (0–7)	1 (0–10)	<1 (0–7)	1 (0–2)	<1 (0–4)	3 (0–24)	<1 (0–7)	23 (10–85)
2000–01	8 (3–21)	<1 (0–2)	2 (0–8)	<1 (0–7)	<1 (0–5)	1 (0–2)	<1 (0–3)	<1 (0–3)	<1 (0–6)	<1 (0–6)
2001–02	4 (1–17)	7 (1–51)	<1 (0–5)	1 (0–4)	9 (3–23)	4 (2–8)	<1 (0–4)	<1 (0–4)	<1 (0–2)	<1 (0–5)
2002–03	9 (4–21)	12 (6–34)	3 (1–9)	2 (0–8)	<1 (0–3)	1 (1–3)	<1 (0–2)	<1 (0–4)	3 (0–16)	<1 (0–3)
2003–04	6 (2–20)	4 (1–15)	<1 (0–2)	2 (0–12)	<1 (0–6)	3 (2–6)	<1 (0–3)	1 (0–3)	1 (0–7)	<1 (0–6)
2004–05	3 (0–23)	<1 (0–8)	1 (0–6)	1 (0–13)	<1 (0–3)	1 (0–2)	<1 (0–3)	<1 (0–7)	1 (0–11)	<1 (0–8)
2005–06	1 (0–7)	1 (0–15)	<1 (0–1)	<1 (0–6)	1 (0–7)	3 (1–6)	<1 (0–3)	<1 (0–7)	1 (0–7)	<1 (0–8)
2006–07	5 (1–19)	<1 (0–10)	2 (1–7)	1 (0–8)	<1 (0–8)	1 (0–2)	<1 (0–4)	<1 (0–4)	<1 (0–6)	<1 (0–7)
2007–08	2 (0–14)	1 (0–10)	3 (1–17)	2 (0–16)	9 (3–29)	1 (0–8)	<1 (0–6)	10 (2–59)	1 (0–16)	<1 (0–12)
2008–09	4 (0–30)	<1 (0–8)	2 (0–27)	1 (0–13)	5 (1–25)	<1 (0–6)	<1 (0–4)	1 (0–10)	1 (0–13)	<1 (0–9)
2009–10	2 (0–27)	1 (0–10)	2 (0–12)	1 (0–25)	<1 (0–9)	<1 (0–2)	<1 (0–5)	<1 (0–9)	1 (0–16)	<1 (0–12)
2010–11	7 (1–38)	3 (0–24)	2 (0–34)	2 (0–26)	1 (0–11)	1 (0–9)	1 (0–11)	1 (0–20)	3 (0–36)	1 (0–22)
2011–12	2 (0–30)	<1 (0–9)	1 (0–13)	1 (0–11)	<1 (0–8)	<1 (0–5)	<1 (0–6)	1 (0–11)	1 (0–11)	<1 (0–10)
2012–13	3 (0–52)	1 (0–20)	30 (11–77)	1 (0–25)	<1 (0–7)	22 (6–78)	<1 (0–7)	1 (0–9)	11 (2–75)	<1 (0–13)
2013–14	2 (0–34)	1 (0–15)	12 (3–40)	24 (9–80)	2 (1–10)	1 (0–6)	<1 (0–7)	7 (1–39)	1 (0–17)	1 (0–13)
2014–15	5 (0–40)	1 (0–27)	1 (0–4)	1 (0–17)	1 (0–21)	<1 (0–5)	1 (0–11)	5 (1–33)	1 (0–9)	1 (0–15)
2015–16	4 (1–16)	1 (0–28)	5 (2–15)	14 (4–46)	1 (0–21)	2 (1–8)	<1 (0–8)	1 (0–12)	1 (0–12)	1 (0–16)
2016–17	8 (2–40)	2 (0–14)	6 (3–12)	17 (4–91)	32 (16–80)	1 (0–3)	<1 (0–8)	1 (0–11)	1 (0–7)	1 (0–15)
slope	0.02	–0.01	0.06	0.09	0.03	0.07	0.01	0.09	0.11	0.04

Total annual bycatch is variable among fisheries (Figure 19). Bycatch in the hoki, hake, and ling trawl fishery rose markedly during the 1990s then dropped again during the mid-2000s, followed by another increase; in nearly all years this fishery produced the highest bycatch weight. Bycatch in the orange roughy fishery has steadily reduced during the period. Overall, bycatch weights were the lowest in the oreo and southern blue whiting trawl fisheries.

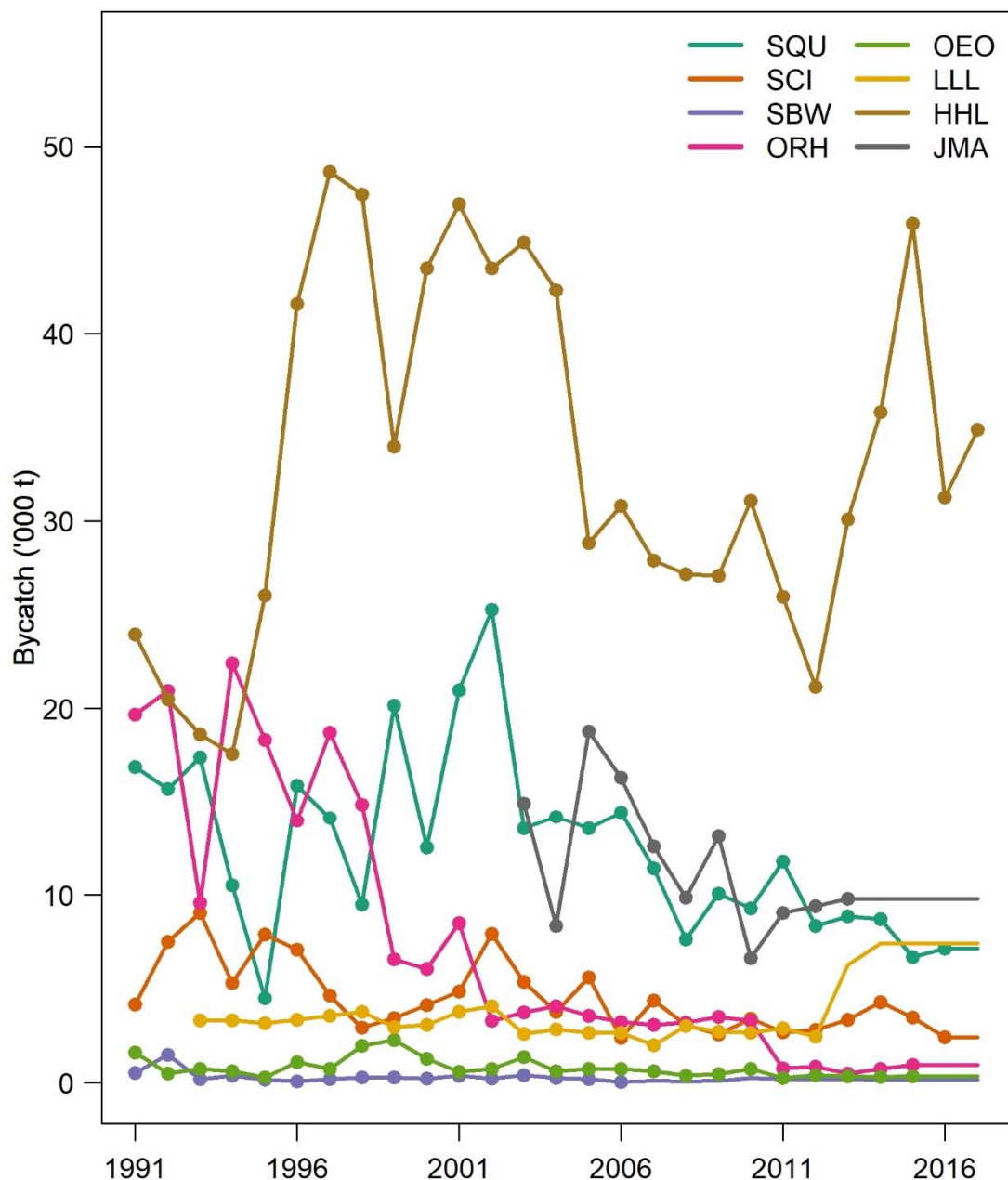


Figure 19: Total bycatch ('000 t) in all Tier-1 deepwater fisheries. Dots denote precision based estimates; no dots denote coarse based estimates.

4. DISCUSSION

Overall, bycatch weights were highly variable across fisheries. The hoki, hake, and ling trawl fishery had the highest bycatch weights in most years, while fisheries with low annual bycatch weights included the oreo and southern blue whiting trawl fisheries. All fisheries examined showed measurable declines or increases in bycatch of certain species over time, and consistent declines or increases (statistically significant or otherwise) were seen for a few species across six or more of the eight fisheries. Those increasing included pale ghost shark (*Hydrolagus bemisi*) (significant in four fisheries), rough skate (*Zearaja nasuta*) (significant in three fisheries), leafscale gulper shark (*Centrophorus squamosus*) (significant in three fisheries), Baxter's dogfish (*Etmopterus granulosus*) (significant in two fisheries), and silverside (*Argentina elongata*) (significant in two fisheries). Those declining were: skates (Rajidae and Arhynchobatidae) (significant in seven fisheries), dark ghost shark (*Hydrolagus novaezealandiae*) (significant in five fisheries), unidentified sharks (significant in five fisheries), and unidentified rattails and bluenose (both significant in four fisheries). Declines of spiny dogfish (SPD) were observed across six fisheries, and while most trends were not significant at this time, these trends may warrant further investigation.

4.1 Trends by fishery

In some cases, the apparent increase or decrease in bycatch of a species may have been due to improvements in species identification, or changes in observer recording practices, over time. Improved species identification has resulted in the reduction in the use of generic codes, such as SKA (skates, Rajidae and Arhynchobatidae), SHA (unidentified sharks) and RAT (unidentified rattails), across many of the fisheries. Inclusion of total fishery catch and effort into future analysis may assist in explaining some of the species trends observed.

Arrow squid trawl

The decrease in paddle crab (PAD) and increase in smooth red swimming crab (NCB) may be due to NCB being erroneously recorded as PAD before 2003–04. Giant spider crab (GSC) is likely to have increasingly been used in place of the generic code for crabs (CRB). The decrease in unspecified rattails (RAT) may be due to increased usage of codes for individual rattail species.

Southern blue whiting trawl

The decrease in unspecified rattails (RAT) may be due to increased usage of codes for individual rattail species. The significant decline in hake (HAK) across the time series may be worth investigating in further detail.

Scampi trawl

Skates (SKA) were mainly recorded as rough skate (RSK) or smooth skate (SSK) after 2002–03. The codes for geometric star (PSI), smooth deepsea anemones (ACS) and Garrick's masking crab (GMC) were not in common usage until after 2000. The decrease in unspecified rattails (RAT) may be due to increased usage of codes for individual rattail species. The significant decline in hoki (HOK) across the time series may be worth investigating in further detail.

Jack mackerel trawl

The significant declines in blue mackerel (EMA), redbait (RBT), spiny dogfish (SPD), and arrow squid (SQU) across the time series may be worth investigating in further detail.

Orange roughy trawl

The decline in the generic shark code (SHA), as well as seal shark (BSH, previously referred to as black shark) may be the result of increased identification to the species level and may explain increases in

longnose velvet dogfish (CYP), Portuguese dogfish (CYL), and Owston's dogfish (CYO). The decrease in unspecified rattails (RAT) may be due to increased usage of codes for individual rattail species.

Oreo trawl

The decline in the generic shark code (SHA), as well as seal shark (BSH, previously referred to as black shark) may be the result of increased identification to the species level. Rattails such as ridge scale rattail (MCA) may not have been well identified in earlier years, leading to a reduction in the use of the generic code (RAT).

Hoki, hake, and ling trawl

Skates (SKA) were mainly recorded as rough skate (RSK) or smooth skate (SSK) after 2002–03. Usage by observers of the invertebrate species codes umbrella octopus (OPI), tam-O'shanter urchins (TAM), and floppy tubular sponge (HYA) is likely to have increased over time, especially after the introduction of identification guides in 2005. The decrease in unspecified rattails (RAT) may be due to increased usage of codes for individual rattail species.

Ling longline

Skates (SKA) were mainly recorded as rough skate (RSK) or smooth skate (SSK) after 2002–03.

4.2 Use of ratio-based method vs statistical method

To date, total bycatch estimates for three fisheries (scampi, arrow squid, and hoki, hake, ling) have been produced using both the ratio-based method and the two-part, binomial/log-normal statistical method (Table 9). Use of the model-based method is advantageous as it allows for the inclusion of additional covariates; here, covariates included fishing year and standard fishery area. The recent analysis of bycatch and discarding in the hoki, hake, and ling fishery also included gear-type (bottom or midwater trawl) and, for discards only, vessel class (Anderson et al., *in prep*). Vessel class was shown to address a potential source of bias in the model when included.

Total bycatch estimates were similar across the two methods for the scampi fishery; for arrow squid, bycatch estimates by the statistical model were mostly lower than those produced by the ratio-based method; and for the hoki, hake, and ling fishery, bycatch estimates produced by the statistical method were consistently higher than those estimated by the ratio-based method, particularly between the 1995–96 to 2003–04 fishing years. These differences have been attributed to the expanded target fishery definition (silver warehou and white warehou are now included), the model-method's ability to more naturally estimate rates in data poor strata, and changes in stratification and small differences in data grooming methods (Anderson et al. *in prep*). The statistical method has been shown to provide robust and accurate results under unbalanced sampling design, even when data are limited (Edwards et al., 2015). If the most accurate estimates are desired then according to the results of this and other work, the statistical modelling method is the most appropriate and will continue to be used in future analyses.

Table 9: Comparison of reported bycatch estimates (in tonnes) using the ratio-based method (Ballara & Anderson 2009, Ballara & O'Driscoll 2015) and the two-part, binomial/log-normal statistical method (Anderson & Edwards 2017, Anderson et al. *in prep*) for the scampi, arrow squid, and hoki, hake, ling fisheries. * = coarse based (no precision) estimate

	<u>Scampi</u>		<u>Arrow squid</u>		<u>Hoki, hake, ling</u>	
	Ratio-based	Statistical	Ratio-based	Statistical	Ratio-based	Statistical
1990–91	-	-	-	-	19 850	23 938
1991–92	-	-	-	-	19 220	20 500
1992–93	-	-	-	-	12 020	18 605
1993–94	-	-	-	-	14 770	17 554
1994–95	-	-	-	-	23 790	26 023
1995–96	-	-	-	-	27 530	41 586
1996–97	-	-	-	-	31 610	48 624
1997–98	-	-	-	-	36 270	47 430
1998–99	-	-	-	-	30 750	33 984
1999–00	-	-	-	-	37 730	43 473
2000–01	-	-	-	-	36 630	46 933
2001–02	-	-	-	-	34 930	43 500
2002–03	5 080	5 361	20 590	13 549	34 940	44 876
2003–04	3 700	3 768	16 230	14 208	36 400	42 320
2004–05	4 990	5 606	17 970	13 556	23 800	28 835
2005–06	2 080	2 404	19 140	14 433	20 600	30 804
2006–07	4 120	4 379	23 660	11 411	19 130	27 893
2007–08	3 780	3 075	10 060	7 621	19 520	27 173
2008–09	2 900	2 581	11 980	10 066	16 560	27 070
2009–10	3 310	3 402	10 380	9 292	19 310	31 094
2010–11	*2 455	2 686	11 230	11 781	15 210	25 968
2011–12	*2 239	2 805	*8 497	8 360	14 330	21 151
2012–13	*3 232	3 365	*10 101	8 856	18 160	30 077
2013–14	*4 406	4 292	*9 265	8 707	*21 278	35 798
2014–15	-	3 480	-	6 704	-	45 863
2015–16	-	2 425	-	7 148	-	31 254
2016–17	-	-	-	7 148	-	34 865

5. ACKNOWLEDGEMENTS

Thanks to Malcolm Francis (NIWA) for reviewing this report. This project was funded by the Ministry for Primary Industries (Project DAE2017/04).

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Table 10: Regression slopes for each species/species group and fishery, from Tables 1–8. Slopes indicating a significant decline in bycatch over time (based on regression analysis) are highlighted in red, with significant increases highlighted in green. Species/species groups are ordered alphabetically; blank cells = not estimated; LLL = ling longline fishery; HHL = hoki/hake/ling trawl fishery.

Species	Fishery								Scientific name
	SBW	SQU	SCI	LLL	JMA	ORH	OEO	HHL	
ACS		0.01	0.21	0.01		0.06		0.19	Actinostolidae
ADT			0.05						<i>Aphrodita</i> spp.
AER			0.03					0.02	<i>Aeneator recens</i>
AFO			0.02						<i>Aristaeomorpha foliacea</i>
AGR								-0.18	<i>Agrostichthys parkeri</i>
AIR			-0.01						<i>Argyripnus iridescens</i>
ALB					0.15			-0.02	<i>Thunnus alalunga</i>
ALL			0.06						<i>Alcithoe larochei</i>
ANC					0.04				<i>Engraulis australis</i>
ANT			-0.02			0.03	-0.01	0.09	Anthozoa
ANZ			0.01						<i>Ecionemia novaezelandiae</i>
API		-0.02	0.06						<i>Alertichthys blacki</i>
APR		0.01	0.07			0.04	0.01	0.05	<i>Apristurus</i> spp.
ARE			0.01						<i>Apatopygus recens</i>
ASR		0.11	0.04	0.1		0.02		0.14	Asteroid
AST			-0.02	-0.01					Astronesthinae
ATT					0.07				<i>Arripis trutta</i>
AWI			0.05						<i>Alcithoe wilsonae</i>
BAC						-0.04			<i>Bathygadus cottoides</i>
BAM			0.06						<i>Bathyploetes</i> spp.
BAR		-0.05		0.01				-0.09	<i>Thyrstites atun</i>
BAS		-0.02	-0.15	0.04				-0.02	<i>Polyprion americanus</i>
BAT									<i>Rouleina</i> spp.
BBE	-0.02	-0.01	-0.04			-0.02	0.01	0.03	<i>Centriscops humerosus</i>
BCA								-0.06	<i>Magnisudis prionosa</i>
BCD		0.09	-0.01	-0.02				-0.01	<i>Paranotothenia magellanica</i>
BCO			-0.01	0.01	-0.02				<i>Parapercis colias</i>
BCR			-0.01					-0.03	<i>Brotulotaenia crassa</i>
BDA								-0.01	<i>Sphyræna novaehollandiae</i>
BEE				0.02		-0.05	0.03	0.02	<i>Diastobranchus capensis</i>
BEL		-0.01	-0.09			-0.02		0.07	<i>Centriscops</i> spp.
BEN					-0.01			0.13	<i>Benthodesmus</i> spp.
BER			-0.01					0.05	<i>Typhlonarke</i> spp.
BES			0.01						<i>Benthopecten</i> spp.
BGZ		0.06							<i>Kathetostoma binigrasella</i>
BHE			0.02					0.02	<i>Bathypsectinura heros</i>
BIG		-0.01							<i>Thunnus obesus</i>
BJA						-0.02	0.01		<i>Mesobius antipodum</i>
BKM									<i>Makaira indica</i>
BNE								-0.03	<i>Benthodesmus elongatus</i>
BNS		-0.06	-0.18	0.01	-0.01	-0.09		-0.07	<i>Hyperoglyphe antarctica</i>
BNT								-0.01	<i>Benthodesmus tenuis</i>

Species	Fishery								Scientific name
	SBW	SQU	SCI	LLL	JMA	ORH	OEO	HHL	
BOA			-0.02					-0.01	<i>Paristiopterus labiosus</i>
BOC	-0.02		0.08						<i>Bolocera</i> spp.
BOE						-0.2	-0.03	0.01	<i>Allocyttus niger</i>
BOT		-0.01	0.01					-0.01	Bothidae
BPE					-0.08				<i>Caesioperca lepidoptera</i>
BPI								0.01	<i>Benthopecten pikei</i>
BRA					-0.07			0.06	<i>Dasyatis brevicaudata</i>
BRC		-0.02	-0.09	0.01					<i>Pseudophycis breviuscula</i>
BRG						0.07			Brisingida
BRS									<i>Echinorhinus brucus</i>
BRZ								0.02	<i>Xenocephalus armatus</i>
BSH	-0.02	-0.03	-0.11	0.06		-0.1	-0.1	-0.03	<i>Dalatias licha</i>
BSK		-0.08				-0.01		-0.13	<i>Cetorhinus maximus</i>
BSL						-0.05	0.01	0.11	<i>Xenodermichthys</i> spp.
BSP								0.06	<i>Taractichthys longipinnis</i>
BSQ						-0.04		-0.04	<i>Sepioteuthis australis</i>
BTA			0.09					0.11	<i>Brochiraja asperula</i>
BTH	-0.03	0.01	0.03			0.02	0.01	-0.01	<i>Notoraja</i> spp.
BTS			0.03			0.02		0.13	<i>Brochiraja spinifera</i>
BWH			0.07		0.01				<i>Carcharhinus brachyurus</i>
BWS		-0.03	0.02	0.04	0.03			-0.05	<i>Prionace glauca</i>
BYD			0.04					0.07	<i>Beryx decadactylus</i>
BYS			-0.12	0.06		-0.16		0.1	<i>Beryx splendens</i>
BYX		-0.01	0.03	0.02		-0.15		-0.04	<i>Beryx splendens</i> , <i>B. decadactylus</i>
CAL			0.1						<i>Caenopedina porphyrogigas</i>
CAM			0.1						<i>Camplyonotus rathbunae</i>
CAN						-0.01			<i>Cataetys niki</i>
CAR		0.13	0.08	0.09	-0.2	-0.03		0.1	<i>Cephaloscyllium isabellum</i>
CAS		0.1						0.01	<i>Coelorinchus aspercephalus</i>
CAY									<i>Caryophyllia</i> spp.
CBB						0.02			Coral rubble
CBD		0.1				0.03	0.03		Coral rubble - dead
CBE		0.02						0.05	<i>Notopogon lilliei</i>
CBI			0.03						<i>Coelorinchus biclinozonalis</i>
CBO	-0.03	0.01	0.03					0.03	<i>Coelorinchus bollonsi</i>
CBX								-0.01	<i>Cubiceps baxteri</i>
CCO								0.01	<i>Coelorinchus cookianus</i>
CCR									<i>Cetonurus crassiceps</i>
CCX			0.03					0.06	<i>Coelorinchus parvifasciatus</i>
CDL						-0.07	-0.02	0.02	Epigonidae
CDO		0.02	0.03		0.01			0.16	<i>Capromimus abbreviatus</i>
CDX			0.08					-0.01	<i>Coelorinchus maurofasciatus</i>
CDY			0.02						<i>Cosmasterias dyscrita</i>
CEN						-0.02			Squalidae
CFA			0.04					0.05	<i>Coelorinchus fasciatus</i>

Species	Fishery								Scientific name
	SBW	SQU	SCI	LLL	JMA	ORH	OEO	HHL	
CHA									<i>Chauliodus sloani</i>
CHC									<i>Chaceon bicolor</i>
CHG				0.03		0.05	0.06	0.06	<i>Chimaera lignaria</i>
CHI			-0.02	-0.01		0.01	0.01	-0.07	<i>Chimaera</i> spp.
CHM								-0.01	Chiasmodontidae
CHP				0.02		0.03	0.03	-0.03	<i>Chimaera</i> sp.
CHQ		0.03						0.01	Cranchiidae
CHR									<i>Chrysogorgia</i> spp.
CHX			-0.03					0.02	<i>Chaunax pictus</i>
CJA			0.1					0.13	<i>Crossaster multispinus</i>
CMA								0.01	<i>Coelorinchus matamua</i>
CMR			0.02						<i>Coluzea mariae</i>
COD						-0.03	-0.01	-0.01	Cod
COF		0.01						0.01	<i>Flabellum</i> spp.
COL			0.01			-0.01		0.07	<i>Coelorinchus oliverianus</i>
CON	-0.02	0.01	-0.06	-0.04	-0.04	-0.02	-0.01	0.07	<i>Conger</i> spp.
COR			-0.01						Stylasteridae
COU		-0.01				-0.07	-0.08	-0.01	Alcyonacea, Scleractinia, Antipatharia, Stylasteridae
CPA			0.08	0.02				0.04	<i>Ceramaster patagonicus</i>
CPD								-0.03	Centrolophidae
CRA		-0.01						-0.01	<i>Jasus edwardsii</i>
CRB		-0.07	-0.07	-0.01		-0.06		0.02	Crab
CRM		0.01							<i>Callyspongia</i> cf <i>ramosa</i>
CRU		-0.01	-0.07					-0.01	Crustacea
CSE						0.03			<i>Coryphaenoides serrulatus</i>
CSH		0.01	-0.05	0.08	-0.05	-0.04		0.04	Catshark
CSP									<i>Coelorinchus spathulatus</i>
CSQ	-0.02	0.01	0.02	0.1		0.08		0.12	<i>Centrophorus squamosus</i>
CST								-0.01	<i>Caristius</i> sp.
CSU						0.01			<i>Coryphaenoides subserrulatus</i>
CTU			-0.01					-0.01	<i>Cookia sulcata</i>
CUB							-0.01	-0.02	<i>Cubiceps</i> spp.
CUC			-0.06		-0.03			0.03	<i>Paraulopus nigripinnis</i>
CVI			0.05						<i>Pycnoplax victoriensis</i>
CYL						0.1		0.1	<i>Centroscymnus coelolepis</i>
CYO				0.01		0.09		0.12	<i>Centroscymnus owstoni</i>
CYP				0.09		0.12	0.11	0.09	<i>Centroscymnus crepidater</i>
DAP		0.02	0.18						<i>Daganaudus petterdi</i>
DAS									<i>Pteroplatytrygon violacea</i>
DCO			0.05						<i>Notophycis marginata</i>
DCS				0.12				0.03	<i>Bythaelurus dawsoni</i>
DDI			0.03						<i>Desmophyllum dianthus</i>
DEA						-0.03		-0.09	<i>Trachipterus trachipterus</i>
DEQ						-0.03		-0.02	<i>Deania quadrispinosum</i>
DHO								0.01	<i>Dermechinus horridus</i>

Species	Fishery								Scientific name
	SBW	SQU	SCI	LLL	JMA	ORH	OEO	HHL	
DIR			0.08					0.02	<i>Diacanthurus rubricatus</i>
DIS									<i>Diretmus argenteus</i>
DMG			0.14	0.07				0.11	<i>Dipsacaster magnificus</i>
DSK		0.01	-0.11	-0.01				0.05	<i>Amblyraja hyperborea</i>
DSP		0.04						-0.01	<i>Congiopodus coriaceus</i>
DSS								0.11	<i>Bathylagus</i> spp.
DWE			-0.04	0.01		-0.07	-0.01	0.11	Whelks
DWO			0.01					-0.06	<i>Graneledone</i> spp.
ECH			-0.03	-0.01			-0.01	0.02	Echinodermata
ECN			0.02	-0.01			-0.01	-0.11	Echinoid
EEL			-0.12	-0.01			-0.01		Eels
EEX		0.02							<i>Enypniastes eximia</i>
EGA			0.01						<i>Euciroa galathea</i>
EGR					0.01				<i>Myliobatis tenuicaudatus</i>
ELE		0.02			0.01				<i>Callorhinchus milii</i>
ELT				0.01				-0.13	<i>Electrona</i> spp.
EMA					-0.04			-0.01	<i>Scomber australasicus</i>
EMO			-0.02					0.01	<i>Etmopterus moller</i>
EPD								0.19	<i>Epigonus denticulatus</i>
EPL			0.01			-0.1	-0.02		<i>Epigonus lenimen</i>
EPO			-0.01					0.07	<i>Melanostigma gelatinosum</i>
EPR			0.01			0.01		0.05	<i>Epigonus robustus</i>
ERA		-0.01	-0.02		0.01	-0.02		0.13	<i>Enallopsammia rostrata</i>
ETB	-0.03	0.02	0.02	0.06		0.06	0.1	0.07	<i>Etmopterus baxteri</i>
ETL		-0.01	0.02	0.03		-0.16		-0.25	<i>Etmopterus lucifer</i>
ETM		-0.01	-0.04	-0.04		-0.19	-0.13	-0.01	<i>Etmopterus</i> sp.
ETP				0.01		-0.01	-0.01	0.13	<i>Etmopterus pusillus</i>
EUC			0.02					0.01	<i>Euclichthys polynemus</i>
EZE		0.06	0.06					-0.02	<i>Enteroctopus zealandicus</i>
FAN								0.07	<i>Pterycombus petersii</i>
FHD		0.01	0.01					-0.06	<i>Hoplichthys haswelli</i>
FLA		0.06	-0.04					-0.02	Flatfish
FLO								0.19	Flounder
FMA		0.03	0.16					-0.02	<i>Fusitriton magellanicus</i>
FOR								-0.07	<i>Forsterygion</i> spp.
FRO		-0.01	-0.05		0.02	-0.02		-0.02	<i>Lepidopus caudatus</i>
FRS								-0.01	<i>Chlamydoselachus anguineus</i>
FUN			0.02					0.04	<i>Funchalia</i> spp.
GAS			0.17						Gastropoda
GAT			0.06						<i>Gastroptychus</i> spp.
GDU			0.03	0.02		0.02	0.01		<i>Goniocorella dumosa</i>
GFL		0.15	-0.02					0.01	<i>Rhombosolea tapiri</i>
GIZ	-0.01	0.02	-0.06	0.07	-0.23	-0.01		0.06	<i>Kathetostoma giganteum</i>
GLS			0.02			0.01			Hexactinellida
GMC		0.03	0.21						<i>Leptomithrax garricki</i>
GMU									<i>Mugil cephalus</i>

Species	Fishery									Scientific name
	SBW	SQU	SCI	LLL	JMA	ORH	OEO	HHL		
GOB										<i>Mitsukurina owstoni</i>
GON		0.18						0.06		<i>Gonorynchus forsteri</i> & <i>G. greyi</i>
DSP		0.04						−0.01		<i>Congiopodus coriaceus</i>
DSS								0.11		<i>Bathylagus</i> spp.
GOR								0.09		<i>Gorgonocephalus</i> spp.
GOU			0.02							<i>Goniocidaris umbraculum</i>
GPA			0.06							<i>Goniocidaris parasol</i>
GRC						0.02	0.04	−0.01		<i>Tripteryphycis gilchristi</i>
GRM								0.03		<i>Gracilechinus multidentatus</i>
GSA								−0.01		<i>Hoplostethus gigas</i>
GSC		0.25	0.09	0.01				0.06		<i>Jacquintia edwardsii</i>
GSH	−0.11		0.01	0.03	−0.27	−0.2	−0.16	−0.11		<i>Hydrolagus novaezealandiae</i>
GSP	0.03	0.06	0.12	0.1		0.07	0.06	0.09		<i>Hydrolagus bemisi</i>
GSQ	−0.01					−0.05	−0.01	−0.01		<i>Architeuthis</i> spp.
GUR		−0.01			−0.02					<i>Chelidonichthys kumu</i>
GVO			0.1					0.01		<i>Provocator mirabilis</i>
HAG		−0.01	−0.07	0.12				0.15		<i>Eptatretus cirrhatus</i>
HAK	−0.04	−0.02	−0.1	0.08	−0.06	−0.03	−0.07	−0.03		<i>Merluccius australis</i>
HAL			−0.05							<i>Halosauropsis macrochir</i>
HAP		0.01		0.05	−0.01			−0.03		<i>Polyprion oxygeneios</i>
HAT				0.19						<i>Sternoptychidae</i>
HCO	−0.02		0.03					0.01		<i>Bassanago hirsutus</i>
HEP			−0.06	0.06				0.04		<i>Hepttranchias perlo</i>
HEX		−0.01	−0.04	0.1				0.11		<i>Hexanchus griseus</i>
HJO				0.01		0.04	0.06			<i>Halargyreus johnsonii</i>
HMT		0.04	0.19	0.02				0.11		<i>Hormathiidae</i>
HOK	−0.07	−0.01	−0.05	0.14	−0.13	−0.03	0.03			<i>Macruronus novaezelandiae</i>
HOO			0.02							<i>Atrina zelandica</i>
HPB		−0.03	−0.16	0.03	−0.15			−0.09		<i>Polyprion oxygeneios</i> , <i>P. americanus</i>
HSI			0.07							<i>Haliporoides sibogae</i>
HTH			0.02			0.06		0.07		Holothurian unidentified
HTR			0.04					0.09		<i>Hippasteria phrygiana</i>
HYA	0.03		0.04					0.2		<i>Hyalascus</i> sp.
HYB										<i>Hydrolagus homonycteris</i>
HYD						−0.01	0.01	−0.02		<i>Hydrolagus</i> sp.
HYM			0.04							<i>Hymenocephalus</i> spp.
HYP								0.01		<i>Hydrolagus trolli</i>
IBR						0.02				<i>Isistius brasiliensis</i>
ISI										<i>Isididae</i>
JAV	0.02	0.03		0.12		−0.05		0.04		<i>Lepidorhynchus denticulatus</i>
JDO		−0.01			−0.04			−0.01		<i>Zeus faber</i>
JFI		−0.02			0.02			0.03		Jellyfish
JGU		−0.01	−0.06		−0.08			0.1		<i>Pterygotrigla picta</i>
JMA		−0.17	−0.1			−0.02		−0.17		<i>Trachurus declivis</i> , <i>T. murphyi</i> , <i>T. novaezealandiae</i>

Species	Fishery								Scientific name
	SBW	SQU	SCI	LLL	JMA	ORH	OEO	HHL	
KIC			−0.01			0.03	−0.01	0.02	<i>Lithodes murrayi</i> , <i>Neolithodes brodiei</i>
KIN					0.13			0.01	<i>Seriola lalandi</i>
KWH								0.01	<i>Austrofucus glans</i>
LAE						−0.02			<i>Laemonema</i> spp.
LAG			0.04						<i>Laetmogone</i> spp.
LAN		0.06	−0.01		0.01			0.07	Myctophidae
LCH	−0.02		0.02			−0.01	0.02	0.02	<i>Harriotta raleighana</i>
LDO	−0.04	−0.01	−0.04			−0.02		0.01	<i>Cyttus traversi</i>
LEA					−0.14				<i>Meuschenia scaber</i>
LEG						−0.01	0.03		<i>Lepidion schmidtii</i> & <i>Lepidion inosimae</i>
LFB								0.02	<i>Zanclistius elevatus</i>
LHE								−0.02	<i>Lampanyctodes hectoris</i>
LHO			0.06					0.03	<i>Lipkius holthuisi</i>
LIN	−0.03	0.02	−0.13		−0.17	−0.06	−0.06		<i>Genypterus blacodes</i>
LLC		0.04	0.05						<i>Leptomithrax longipes</i>
LMI			0.02						<i>Leptomithrax</i> spp.
LMU			0.05					0.01	<i>Lithodes murrayi</i>
LVN								0.02	<i>Lithosoma novaezelandiae</i>
LPI							0.01		<i>Lepidion inosimae</i>
LPS						0.02	−0.01		<i>Lepidion schmidtii</i>
LSO		0.01	0.02					0.05	<i>Pelotretis flavilatus</i>
LUC			0.02			−0.02		−0.02	<i>Luciosudus</i> sp.
MAK	−0.02	−0.04	0.02	0.11	0.06	−0.02		−0.07	<i>Isurus oxyrinchus</i>
MAN	−0.04	−0.01						−0.04	<i>Neoachirosetta milfordi</i>
MCA						0.08	0.11	−0.09	<i>Macrourus carinatus</i>
MDO		−0.02			−0.02	−0.01			<i>Zenopsis nebulosa</i>
MGA			0.02						<i>Microstoma microstoma</i>
MIC									<i>Munida gracilis</i>
MIQ	−0.02		−0.02			−0.06	−0.02	0.02	<i>Onykia ingens</i>
MNI			0.15						<i>Munida</i> spp.
MOC									<i>Madrepora oculata</i>
MOD			0.02			0.06	0.03	0.06	Moridae
MOK		−0.04	−0.01					−0.04	<i>Latridopsis ciliaris</i>
MOL			−0.04					−0.01	Molluscs
MOO	−0.15				−0.06			−0.2	<i>Lampris guttatus</i>
MOR				0.02		−0.01		−0.01	Muraenidae
MRL									Muraenolepididae
MRQ								0.03	<i>Onykia robsoni</i>
MSL			0.06	0.01					<i>Mediaster sladeni</i>
MST						0.01			Melanostomiidae
MUR						−0.01			<i>Muraenolepis marmoratus</i>
NAT			0.01						<i>Nectocarcinus antarcticus</i>
NCA									<i>Natant decapod</i>
NCB		0.19							<i>Nectocarcinus bennetti</i>
NEB						0.04	0.01	0.01	<i>Neolithodes brodiei</i>

Species	Fishery								Scientific name
	SBW	SQU	SCI	LLL	JMA	ORH	OEO	HHL	
NEX								-0.01	Nemichthyidae
NMP		-0.01	-0.1	0.06	-0.13			-0.03	<i>Nemadactylus macropterus</i>
NOC								0.01	<i>Notacanthus chemnitzii</i>
NOT		-0.07	-0.02	-0.06					Notototheniidae
NSD			0.01	0.07	-0.09			0.15	<i>Squalus griffini</i>
OCP			0.01					-0.02	Octopod
OCT		0.01	-0.05	0.02		-0.06	-0.01	-0.04	<i>Pinnoctopus cordiformis</i>
ODO		-0.01		0.01	-0.03			-0.01	<i>Odontaspis ferox</i>
OEO						-0.15	-0.1	-0.05	<i>P. maculatus</i> , <i>A. niger</i> , & <i>N. rhomboidalis</i>
OFH			-0.03			-0.08		-0.04	<i>Ruvettus pretiosus</i>
OLY			0.01						<i>Ophiomusium lymani</i>
ONG	-0.02	0.06	0.02			0.04		-0.05	Porifera
OPA		0.13	0.08					0.04	<i>Hemerocoetes</i> spp.
OPE		0.08	0.07		-0.15	-0.01		-0.04	<i>Lepidoperca aurantia</i>
OPH			0.01			-0.01			Ophiuroid
OPI			0.12					0.24	<i>Opisthoteuthis</i> spp.
OPL		0.01							Opheliidae
ORH						-0.06	-0.07		<i>Hoplostethus atlanticus</i>
OSK			0.15	0.02		0.03		0.2	Rajidae
PAB							0.02		<i>Paragorgia arborea</i>
PAD		-0.23							<i>Ovalipes catharus</i>
PAG			0.05					0.02	Paguroidea
PAH	0.15							-0.01	<i>Lampris immaculatus</i>
PAL								-0.01	Paralepididae
PAM			0.07						<i>Pannychia moseleyi</i>
PAO			0.01					0.01	<i>Pillsburiaster aoteanus</i>
PCH			0.07						<i>Penion chathamensis</i>
PCO			-0.03						<i>Auchenoceros punctatus</i>
PDG		0.02	-0.02			-0.06		0.04	<i>Oxynotus bruniensis</i>
PED			-0.02						<i>Aristaeopsis edwardsiana</i>
PFL			0.04						<i>Pseudechinus flemingi</i>
PHO		0.02						-0.02	<i>Phosichthys argenteus</i>
PHW		0.01							<i>Psammocinia cf hawere</i>
PIG	-0.04	0.14						0.07	<i>Congiopodus leucopaecilus</i>
PIL					0.14				<i>Sardinops sagax</i>
PKN				0.01				0.07	<i>Plutonaster knoxi</i>
PLS		0.01	-0.01	0.11		0.02	0.01	0.06	<i>Proscymnodon plunketi</i>
PLY			0.01					0.02	<i>Polycheles</i> spp.
PLZ			-0.04						<i>Pleuroscopus pseudodorsalis</i>
PMO			0.02			0.01		0.01	<i>Pseudostichopus mollis</i>
PMU			0.03						<i>Paramaretia peloria</i>
PNE			0.07	0.01				0.02	<i>Proserpister neozelanicus</i>
PNN			0.01					0.01	<i>Pennatula</i> spp.
PNO			0.01						<i>Pteropeltarion novaezelandiae</i>
POP					0.01				<i>Allomycterus jaculiferus</i>

Species	Fishery								Scientific name
	SBW	SQU	SCI	LLL	JMA	ORH	OEO	HHL	
POR		-0.04			-0.01			-0.19	<i>Nemadactylus douglasii</i>
POS	0.01	-0.03		0.02	-0.04			-0.07	<i>Lamna nasus</i>
PRA			0.06					0.01	Prawn
PRK			0.12					0.04	<i>Ibacus alticrenatus</i>
PRU			0.04					0.04	<i>Pseudechinaster rubens</i>
PSE							-0.01		<i>Pseudechinus</i> spp.
PSI			0.25	0.06				0.14	<i>Psilaster acuminatus</i>
PSK			0.04	0.02		0.07	-0.01	0.05	<i>Bathyraja shuntovi</i>
PSO								-0.02	<i>Psolus</i> spp.
PSQ								0.09	<i>Pholidoteuthis massyae</i>
PSY			-0.03			0.05	-0.01	-0.03	<i>Psychrolutes microporos</i>
PTO				0.02					<i>Dissostichus eleginoides</i>
PZE								0.01	<i>Paralomis zealandica</i>
QSC		0.12							<i>Psychrochlamys delicatula subantactica</i>
RAG						-0.05		-0.11	<i>Pseudocyttus australis</i>
RAT	-0.15	-0.04	-0.02	0.06	-0.13	-0.06	0.02	0.01	Macrouridae Torpedinidae, Dasyatidae, Myliobatidae, Mobulidae
RAY			-0.05		-0.03				
RBM	0.06	-0.11		-0.03	0.01	-0.01		-0.03	<i>Brama brama</i>
RBT		-0.06			-0.06			0.1	<i>Emmelichthys nitidus</i>
RBY		-0.01	-0.1		-0.02			-0.05	<i>Plagiogeneion rubiginosum</i>
RCH						0.09	0.02	0.02	<i>Rhinochimaera pacifica</i>
RCO	0.03		-0.04	0.04	-0.25			-0.06	<i>Pseudophycis bachus</i>
RDO		0.04	-0.01		-0.01				<i>Cyttopsis roseus</i>
RHY			0.09		-0.06	0.01		0.12	<i>Paratrachichthys trailli</i>
RIB		0.03	-0.14			-0.03	-0.05	-0.02	<i>Mora moro</i>
RIS								0.03	<i>Bathyraja richardsoni</i>
RMU								-0.01	<i>Upeneichthys lineatus</i>
ROC			-0.02			0.01	0.01		<i>Lotella rhacinus</i>
RSC									<i>Scorpaena papillosa</i>
RSK	0.01	0.14	0.07	0.08	0.01	0.02		0.08	<i>Zearaja nasuta</i>
RSN			-0.01	0.02	-0.03			-0.01	<i>Centroberyx affinis</i>
RSO		-0.08	-0.07	0.04	-0.07			0.01	<i>Rexea solandri</i>
RSQ						-0.05		-0.07	<i>Ommastrephes bartrami</i>
RUD		-0.04	-0.06			-0.1	-0.02	-0.01	<i>Centrolophus niger</i>
SAI								0.01	<i>Istiophorus platypterus</i>
SBI						0.02	-0.01	-0.02	<i>Alepocephalus australis</i>
SBK			-0.03			-0.02	0.02	0.05	<i>Notacanthus sexspinis</i>
SBO	-0.03	-0.01						0.05	<i>Pseudopentaceros richardsoni</i>
SBR		0.06	-0.04	0.11		-0.03		0.08	<i>Pseudophycis barbata</i>
SBW		0.07	-0.02					0.1	<i>Micromesistius australis</i>
SCA		0.01							<i>Pecten novaezelandiae</i>
SCD		0.04						-0.01	<i>Notothenia microlepidota</i>
SCG		-0.01	-0.02		0.07			0.01	<i>Lepidotrigla brachyoptera</i>
SCH		0.06	-0.06	0.06	-0.13			0.03	<i>Galeorhinus galeus</i>
SCI								0.09	<i>Metanephrops challengerii</i>

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	SBW	SQU	SCI	LLL	JMA	ORH	OEO	HHL	
SCM			-0.01	0.04		-0.03		-0.04	<i>Centroscymnus macracanthus</i>
SCO			0.06	0.13				0.13	<i>Bassanago bulbiceps</i>
SDE								-0.01	<i>Cryptopsaras couesii</i>
SDF			0.1					0.03	<i>Azygopus pinnifasciatus</i>
SDM			0.15					0.02	<i>Sympagurus dimorphus</i>
SDO		0.15	-0.03		0.03			0.07	<i>Cyttus novaezealandiae</i>
SEE			-0.05	0.06					<i>Gnathophis habetus</i>
SER			0.01						<i>Sergestes</i> spp.
SEV		0.02	0.05	0.09	-0.04			0.09	<i>Notorynchus cepedianus</i>
SFL		0.03							<i>Rhombosolea plebeia</i>
SFN						0.02			<i>Diretmichthys parini</i>
SHA		-0.06	-0.09	0.03	-0.06	-0.1	-0.13	-0.07	Shark
SHE						-0.02		-0.04	<i>Scymnodalatias sherwoodi</i>
SHL			-0.05						<i>Scyllarus</i> sp.
SIA						0.03	0.01		<i>Scleractinia</i>
SKA	-0.04	-0.1	-0.22	-0.08	-0.18	-0.11	-0.03	-0.3	Rajidae & Arhynchobatidae
SKJ		0.01			0.01				<i>Katsuwonus pelamis</i>
SLB								0.01	<i>Scymnodalatias albicauda</i>
SLC						-0.02			<i>Slosarczykovia circumantarctica</i>
SLG			-0.04						<i>Scutus breviculus</i>
SLK						0.04	0.04	0.11	Alepocephalidae
SLR			-0.04						<i>Optivus elongatus</i>
SMC			0.01			-0.05	0.06	-0.01	<i>Lepidion microcephalus</i>
SMI									<i>Somniosus microcephalus</i>
SMK			0.16					0.01	<i>Teratomaia richardsoni</i>
SMO		0.04	0.05						<i>Sclerasterias mollis</i>
SMT			0.03						<i>Spatangus mathesoni</i>
SNA					0.09	-0.02		-0.11	<i>Pagrus auratus</i>
SND		0.01	-0.1	0.09		0.02	0.01		<i>Deania calcea</i>
SNE									<i>Simenchelys parasitica</i>
SNI		-0.01	-0.01		-0.01			-0.01	<i>Macroramphosus scolopax</i>
SNO									<i>Sio nordenskjoeldii</i>
SNR						-0.12	0.01	-0.02	<i>Deania histricosa</i>
SOL			0.01						Sole
SNA					0.09	-0.02		-0.11	<i>Pagrus auratus</i>
SOP						-0.14		-0.02	<i>Somniosus pacificus</i>
SOR						-0.06	0.02	-0.02	<i>Neocyttus rhomboidalis</i>
SOT				0.01				0.04	<i>Solaster torulatus</i>
SPD	-0.03	-0.03	0.05	0.05	-0.12	-0.18	-0.03	-0.01	<i>Squalus acanthias</i>
SPE		-0.05	-0.01	0.03	-0.24	-0.06			<i>Helicolenus</i> spp.
SPF									<i>Pseudolabrus miles</i>
SPI		-0.07	-0.1			-0.03	-0.01	-0.09	Spider crab
SPK			-0.02					-0.01	<i>Macrorhamphosodes uradoi</i>
SPO		0.03	-0.11	0.11	-0.19			-0.07	<i>Mustelus lenticulatus</i>
SPR								-0.01	<i>Sprattus antipodum</i> , <i>S. muelleri</i>

Species	Fishery								Scientific name
	SBW	SQU	SCI	LLL	JMA	ORH	OEO	HHL	
SPT			0.13					0.01	<i>Spatangus multispinus</i>
SPZ			-0.01					-0.03	<i>Genyagnus monopterygius</i>
SQA				0.01		0.01	0.01	0.01	<i>Squalus</i> spp.
SQU			0.03		-0.08	-0.1		0.01	<i>Nototodarus sloanii</i> , <i>N. gouldi</i>
SQX	0.01		-0.06			-0.01	-0.03	0.08	Squid
SRB	0.01								<i>Brama australis</i>
SRH			0.01			-0.02		0.12	<i>Hoplostethus mediterraneus</i>
SRI						-0.01		-0.03	<i>Scymnodon ringens</i>
SSC		-0.09	-0.03						<i>Leptomithrax australis</i>
SSH		0.03	-0.02	0.12		-0.01		0.12	<i>Gollum attenuatus</i>
SSI	-0.07	0.13	0.05		-0.08	-0.02	-0.01	0.03	<i>Argentina elongata</i>
SSK	-0.02	-0.02	0.01	0.04	-0.18	-0.03	0.01	0.05	<i>Dipturus innominatus</i>
SSM						0.08	0.08	0.01	<i>Alepocephalus antipodianus</i>
SSO						-0.15		-0.06	<i>Pseudocyttus maculatus</i>
SSP								-0.02	<i>Pecten novaezelandiae</i>
SSQ			0.03		0.01				<i>Sepioloidea</i> spp.
STG		-0.01	0.01		-0.01			-0.09	Stargazer
STN		-0.01			-0.01			0.06	<i>Thunnus maccoyii</i>
STR		-0.01	-0.06		-0.06			-0.01	Stingray
STU	-0.02	-0.07			0.03			-0.07	<i>Allothunnus fallai</i>
SUH								-0.01	<i>Schedophilus huttoni</i>
SPT			0.13					0.01	<i>Spatangus multispinus</i>
SUN		-0.06			0.08			-0.01	<i>Mola mola</i>
SUR			-0.05					-0.03	<i>Evechinus chloroticus</i>
SVA						0.01	0.01		<i>Solenosmilia variabilis</i>
SWA		0.02	-0.12		-0.09	-0.03		-0.04	<i>Seriotelella punctata</i>
SWO					0.01				<i>Xiphias gladius</i>
SWR						-0.02			<i>Coris sandageri</i>
SYN			-0.01			-0.06		0.01	Synphobranchidae
TAL						0.02			<i>Talismania longifilis</i>
TAM			0.02			0.07	0.03	0.21	Echinothuriidae, Phormosomatidae
TAY			0.05					0.03	<i>Typhlorke aysoni</i>
TDQ								0.03	<i>Taningia danae</i>
TFA			0.21						<i>Trichopeltarion fantasticum</i>
THR		-0.15		0.07	-0.03			-0.06	<i>Alopias vulpinus</i>
TLD									<i>Tetilla leptoderma</i>
TLO									<i>Telesto</i> spp.
TOA		0.08	-0.07	0.02		0.04	-0.01	0.05	<i>Neophrynichthys</i> sp.
TOD		0.07	0.02					0.02	<i>Neophrynichthys latus</i>
TOP	-0.02		0.08	0.02		0.02		0.1	<i>Amblophthalmos angustus</i>
TOR		0.02						-0.03	<i>Thunnus orientalis</i>
TRE								-0.01	<i>Pseudocaranx georgianus</i>
TRS					0.01				<i>Trachyscorpia eschmeyeri</i>
TRU		0.02		0.02				-0.02	<i>Latris lineata</i>
TSQ						0.04	0.02	0.14	<i>Todarodes filippovae</i>

Species	Fishery								Scientific name
	SBW	SQU	SCI	LLL	JMA	ORH	OEO	HHL	
TTA			0.02						<i>Typhlonarke tarakea</i>
TUR		0.01							<i>Colistium nudipinnis</i>
TVI								0.01	<i>Trachonurus villosus</i>
URP			0.01						<i>Uroptychus</i> spp.
VCO						-0.01	0.06	-0.02	<i>Antimora rostrata</i>
VIT							-0.01		<i>Vitjazmaia latidactyla</i>
VNI								0.03	<i>Lucigadus nigromaculatus</i>
VOL			-0.02					0.01	Volutidae
VSQ						0.03		0.13	<i>Histioteuthis</i> spp.
WAR					-0.07			-0.12	<i>Seriotelella brama</i>
WHE		-0.04	0.04					0.04	Witch
WHR		0.02				-0.07			<i>Trachyrincus longirostris</i>
WHX						0.05		0.11	<i>Trachyrincus aphyodes</i>
WIT		0.05	0.1			0.03		0.09	<i>Arnoglossus scapha</i>
WOE						-0.01	-0.04		<i>Allocyttus verrucosus</i>
WPS		-0.07							<i>Carcharodon carcharias</i>
WRA					0.03			0.03	<i>Dasyatis thetidis</i>
WSE					-0.01				Labridae
WSQ	-0.01	0.09	0.02			0.02	0.05	-0.03	<i>Onykia</i> spp.
WWA	-0.06		-0.03	-0.01		-0.01		0.03	<i>Seriotelella caerulea</i>
YBF									<i>Rhombosolea leporina</i>
YBO			0.08					0.15	<i>Pentaceros decacanthus</i>
YCO		0.07							<i>Parapercis gilliesi</i>
YEM		-0.01							<i>Aldrichetta forsteri</i>
YFN		-0.02						-0.04	<i>Thunnus albacares</i>
YSG			-0.01						<i>Pterygotrigla pauli</i>
YSP			0.01						<i>Yaldwynopsis spinima</i>
ZAS						0.02			<i>Zameus squamulosus</i>
ZOR			0.12	0.01				0.09	<i>Zoroaster</i> spp.