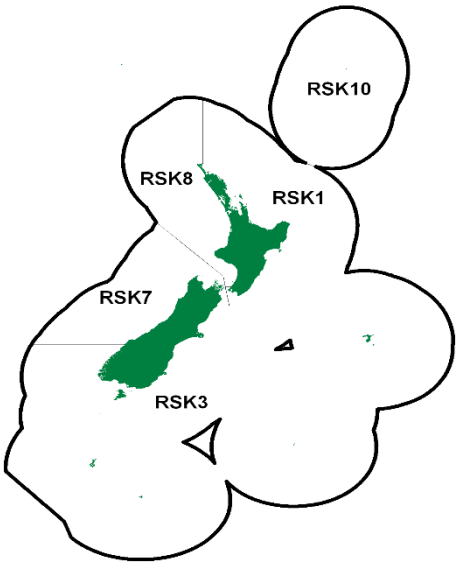
# ROUGH SKATE (RSK)

(*Zearaja nasuta*)

Waewae




## 1. FISHERY SUMMARY

### 1.1 Commercial fisheries

Rough skate (*Zearaja nasuta*, RSK) are fished commercially in New Zealand in close association with smooth skates, which are also known as barndoor skates. Although rough skates grow considerably smaller than smooth skates, RSK is still landed and processed. Two other species of deepwater skate (*Bathyraja shuntovi* and *Raja hyperborea*) are large enough to be of commercial interest, but are relatively uncommon and probably comprise a negligible proportion of the landings.

Skate flesh ammoniates rapidly after death, so the wings are removed at sea, and chilled or frozen. On arrival at the shore factories, the wings are machine-skinned, graded and packed for sale. Most of the product is exported to Europe, especially France and Italy. Skates of all sizes are processed, although some factories impose a minimum weight limit of about 1 kg (200 g per wing), and occasionally wings from very large smooth skates are difficult to market.

Rough skates occur throughout New Zealand, but are most abundant around the South Island in depths down to 500 m. Most of the catch is taken as bycatch by bottom trawlers, but skates are also taken by longliners. Significant longline bycatch has been reported from the Bounty Plateau in QMA 6. There is no clear separation of the depth ranges inhabited by rough and smooth skates; however, smooth skate tend to occur slightly deeper than rough skate (Beentjes & Stevenson 2000, 2001, Stevenson & Hanchet 2000).

Many fishers and processors did not previously distinguish rough and smooth skates in their landing returns, and coded them instead as “skates” (SKA). Because it is impossible to determine the species composition of the catch from landings data prior to introduction of these species into the QMS in 2003, all pre-QMS data reported here consist of the sum of the three species codes RSK, SSK and SKA. Landings have been converted from processed weight to whole weight by application of conversion factors. Further, following introduction into the QMS in 2003, the two skate species were not always correctly identified and a considerable, but unknown, catch of either species is misidentified with over-reporting of rough skate and, correspondingly, under-reporting of smooth skate (Beentjes 2005). Neither fishers nor processors were distinguishing between the two skate species or reporting catches of each species correctly at the time of the study in 2004. It is not known if reporting has improved since this time.

There have been historical changes to the conversion factors applied to skates by MAF Fisheries and Ministry of Fisheries. No record seems to have been kept of the conversion factors in use before 1987, so it is not possible to reconstruct the time series of landings data using the currently accepted factors. Consistent and appropriate conversion factors have been applied to skate landings since the end of the 1986–87 fishing year. Before that, it appears that a lower conversion factor was applied, resulting in an underestimation of landed weight by about 20%. No correction has been made for that in this report.

New Zealand annual skate landings, estimated from a variety of sources, are shown in Table 1. No FSU deepwater data were available before 1983, and it is not known whether deepwater catches, including those of foreign fishing vessels, were significant during that period. CELR and CLR data are provided by inshore and deepwater trawlers respectively. "CELR estimated" landings were always less than "CELR landed" landings, because the former include only the top five fish species (by weight) caught by trawlers, whereas the latter include all species landed. As a relatively minor bycatch, skates frequently do not fall into the top five species. The sum of the "CELR landed" and CLR data provides an estimate of the total skate landings. This estimate usually agreed well with LFRR data supplied by fish processors, especially in 1993–94 and 1994–95, but in 1992–93 the difference was 467 t. The "best estimate" of the annual historical landings comes from FSU data up to 1985–86, and LFRR data thereafter.

**Table 1: New Zealand skate landings for calendar years 1974–1983, and fishing years (1 October–30 September) 1983–84 to 1995–96. Values in parentheses are based on part of the fishing year only. Landings do not include foreign catch before 1983, or unreported discards. FSU = Fisheries Statistics Unit; CELR = Catch, Effort and Landing Return; CLR = Catch Landing Return; LFRR = Licensed Fish Receivers Return; Best Estim. = best available estimate of the annual skate catch; - = no data.**

| | FSU | | | CELR | | | CELR Landed | | |
|---|---|---|---|---|---|---|---|---|---|
| Year | Inshore | Deepwater | Total | Estim.. | Landed | CLR | +CLR | LFRR | Best Estimate |
| 1974 | 23 | - | - | - | - | - | - | - | 23 |
| 1975 | 30 | - | - | - | - | - | - | - | 30 |
| 1976 | 28 | - | - | - | - | - | - | - | 28 |
| 1977 | 27 | - | - | - | - | - | - | - | 27 |
| 1978 | 36 | - | - | - | - | - | - | - | 36 |
| 1979 | 165 | - | - | - | - | - | - | - | 165 |
| 1980 | 441 | - | - | - | - | - | - | - | 441 |
| 1981 | 426 | - | - | - | - | - | - | - | 426 |
| 1982 | 648 | - | - | - | - | - | - | - | 648 |
| 1983 | 634 | 178 | 812 | - | - | - | - | - | 812 |
| 1983–84 | 686 | 298 | 983 | - | - | - | - | - | 983 |
| 1984–85 | 636 | 250 | 886 | - | - | - | - | - | 886 |
| 1985–86 | 613 | 331 | 944 | - | - | - | - | - | 944 |
| 1986–87 | 723 | 285 | 1 007 | - | - | - | - | 1 019 | 1 019 |
| 1987–88 | 1 005 | 421 | 1 426 | - | - | - | - | 1 725 | 1 725 |
| 1988–89 | (530) | (136) | (665) | (252) | (265) | (28) | (293) | 1 513 | 1 513 |
| 1989–90 | - | - | - | 780 | 1 171 | 410 | 1 581 | 1 769 | 1 769 |
| 1990–91 | - | - | - | 796 | 1 334 | 359 | 1 693 | 1 820 | 1 820 |
| 1991–92 | - | - | - | 1 112 | 1 994 | 703 | 2 698 | 2 620 | 2 620 |
| 1992–93 | - | - | - | 1 175 | 2 595 | 824 | 3 418 | 2 951 | 2 951 |
| 1993–94 | - | - | - | 1 247 | 2 236 | 788 | 3 024 | 2 997 | 2 997 |
| 1994–95 | - | - | - | 956 | 1 973 | 829 | 2 803 | 2 789 | 2 789 |
| 1995–96 | - | - | - | - | - | - | - | 2 789 | 2 789 |

Total skate landings (based on the "best estimate" in Table 1) were negligible up to 1978, presumably because of a lack of suitable markets and the availability of other more abundant and more desirable species. Landings then increased linearly to reach nearly 3000 t in 1992–93 and 1993–94, and remained between 2600 and 3100 t until the separation of skate species under the QMS. Reported landings of rough skate are provided in Table 2.

Rough skates (RSK) were introduced into the QMS as a separate species from 1 October 2003 with allowances, TACCs and TACs as in Table 3. Figure 1 shows the historical landings and TACC values for the main RSK stocks. Owing to problems associated with identification of rough and smooth skates, reported catches of each species are probably not accurate (Beentjes 2005). Initiatives to improve

identification of these species begun in 2003 may have resulted in more accurate data.

**Table 2: Reported landings (t) of SKA and RSK by QMA and fishing year, 1996–97 to present.**

| Fishstock | | RSK 1 | | RSK 3 | | RSK 7 | | RSK 8 | | RSK 10 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FMA | | 1–2 | | 3–6 | | 7 | | 8–9 | | 10 | | All |
| Skate (SKA)* | Land. | TACC | Land. | TACC | Land. | TACCI | Land. | TACC | Land. | TACC | Total |
| 1996–97 | 43 | - | 894 | - | 380 | - | 30 | - | 0 | - | 1 347 |
| 1997–98 | 44 | - | 855 | - | 156 | - | 31 | - | 0 | - | 1 086 |
| 1998–99 | 48 | - | 766 | - | 228 | - | 12 | - | 0 | - | 1 054 |
| 1999–00 | 75 | - | 775 | - | 253 | - | 25 | - | 0 | - | 1 128 |
| 2000–01 | 88 | - | 933 | - | 285 | - | 28 | - | 0 | - | 1 334 |
| 2001–02 | 132 | - | 770 | - | 311 | - | 35 | - | 0 | - | 1 248 |
| 2002–03 | 121 | - | 857 | - | 293 | - | 32 | - | 0 | - | 1 303 |
| 2003–04 | < 1 | - | < 1 | - | < 1 | - | < 1 | - | 0 | - | 1 |
| Rough skate (RSK) | | | | | | | | | | | |
| 1996–97 | 15 | - | 265 | - | 69 | - | 3 | - | 0 | - | 352 |
| 1997–98 | 32 | - | 493 | - | 44 | - | 5 | - | 0 | - | 574 |
| 1998–99 | 22 | - | 607 | - | 33 | - | 4 | - | 0 | - | 666 |
| 1999–00 | 20 | - | 720 | - | 37 | - | 2 | - | 0 | - | 779 |
| 2000–01 | 27 | - | 569 | - | 42 | - | 4 | - | 0 | - | 642 |
| 2001–02 | 24 | - | 607 | - | 25 | - | 3 | - | 0 | - | 659 |
| 2002–03 | 18 | - | 1 060 | - | 27 | - | 11 | - | 0 | - | 1 118 |
| 2003–04 | 48 | 111 | 1 568 | 1 653 | 191 | - | 33 | - | 0 | - | 1 840 |
| 2004–05 | 72 | 111 | 1 815 | 1 653 | 173 | 201 | 55 | 21 | 0 | 0 | 2 115 |
| 2005–06 | 72 | 111 | 1 446 | 1 653 | 153 | 201 | 28 | 21 | 0 | 0 | 1 699 |
| 2006–07 | 68 | 111 | 1 475 | 1 653 | 197 | 201 | 35 | 21 | 0 | 0 | 1 768 |
| 2007–08 | 80 | 111 | 1 239 | 1 653 | 206 | 201 | 46 | 21 | 0 | 0 | 1 573 |
| 2008–09 | 79 | 111 | 1 591 | 1 653 | 226 | 201 | 46 | 21 | 0 | 0 | 1 942 |
| 2009–10 | 87 | 111 | 1 546 | 1 653 | 225 | 201 | 46 | 21 | 0 | 0 | 1 905 |
| 2010–11 | 91 | 111 | 1 547 | 1 653 | 199 | 201 | 45 | 21 | 0 | 0 | 1 882 |
| 2011–12 | 76 | 111 | 1 257 | 1 653 | 189 | 201 | 41 | 21 | 0 | 0 | 1 563 |
| 2012–13 | 92 | 111 | 1 573 | 1653 | 180 | 201 | 44 | 21 | 0 | 0 | 1 889 |
| 2013–14 | 105 | 111 | 1 798 | 1 653 | 166 | 201 | 54 | 21 | 0 | 0 | 2 122 |
| 2014–15 | 88 | 111 | 1 324 | 1 653 | 151 | 201 | 41 | 21 | 0 | 0 | 1 605 |
| 2015–16 | 87 | 111 | 1 263 | 1 653 | 171 | 201 | 31 | 21 | 0 | 0 | 1 553 |

*Use of the code SKA ceased once skates were introduced into the QMS in October 2003 and rough skates and smooth skates were recognised as a separate species. From this time all landings of skates have been reported against either the RSK or SSK code.

**Table 3: Recreational, customary, and other mortality allowances (t), Total Allowable Commercial Catches (TACC, t) and Total Allowable Catches (TAC, t) declared for RSK on introduction into the QMS in October 2003.**

| Fishstock | Recreational Allowance | Customary non-commercial Allowance | Other Mortality | TACC | TAC |
|---|---|---|---|---|---|
| RSK 1 (FMAs 1–2) | 1 | 1 | 1 | 111 | 114 |
| RSK 3 (FMAs 3–6) | 1 | 1 | 17 | 1 653 | 1 672 |
| RSK 7 | 1 | 1 | 2 | 201 | 205 |
| RSK 8 (FMAs 8–9) | 1 | 1 | 1 | 21 | 24 |
| RSK 10 | 0 | 0 | 0 | 0 | 0 |

## 1.2 Recreational fisheries

Recreational fishing surveys indicate that rough skates are very rarely caught by recreational fishers.

## 1.3 Customary non-commercial fisheries

Quantitative information on the level of customary non-commercial take is not available.

## 1.4 Illegal catch

Quantitative information on the level of illegal catch is not available.

### 1.5 Other sources of mortality

Because skates are taken mainly as bycatch of bottom trawl fisheries, historical catches have probably been proportional to the amount of effort in the target trawl fisheries. Past catches were probably higher than historical landings data suggest, because of unrecorded discards and unrecorded foreign catch before 1983.

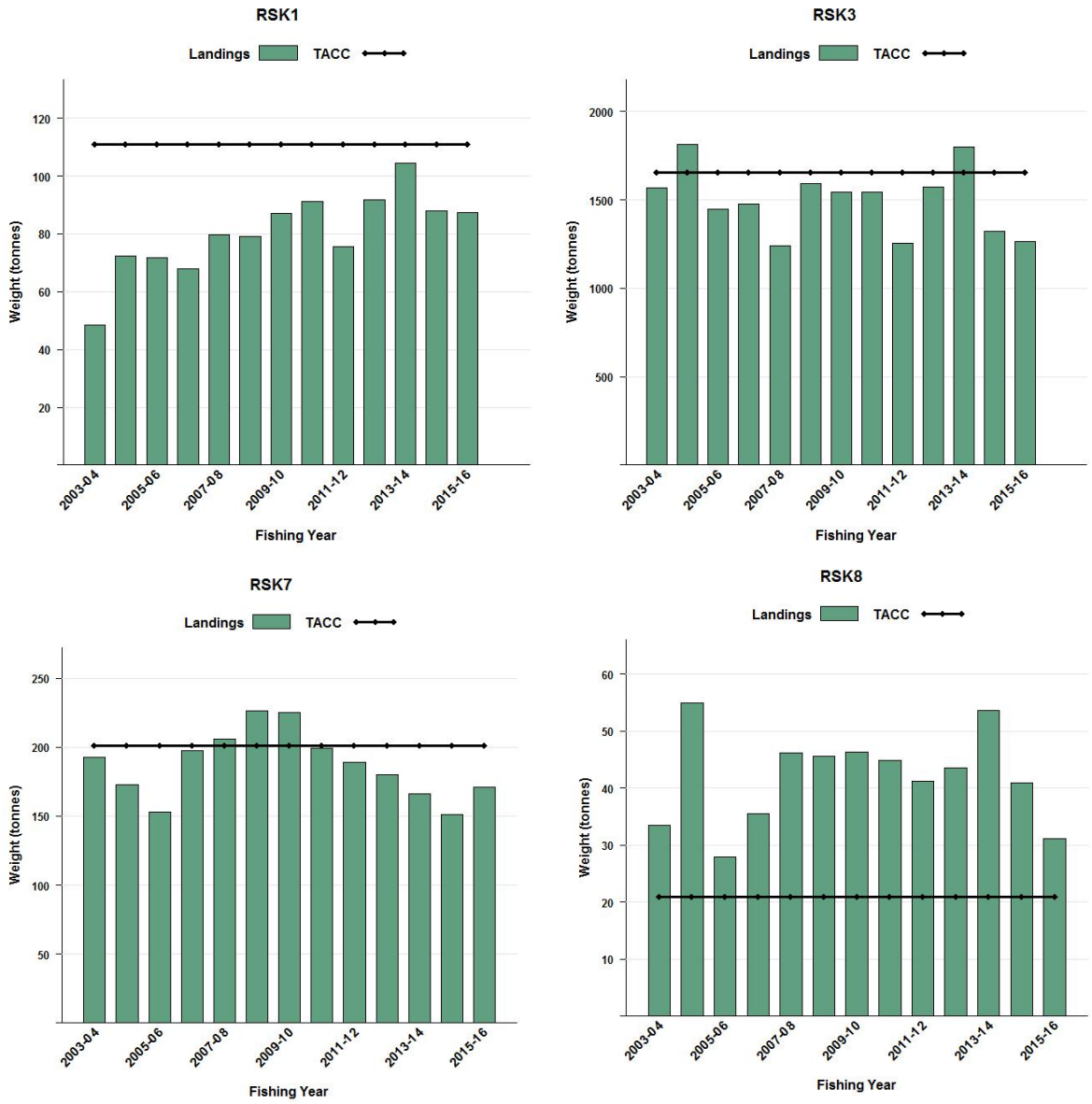



**Figure 1: Reported commercial landings and TACC for the four main RSK stocks. From top left to bottom right: RSK 1 (Auckland East), RSK 3 (South East Coast, South East Chatham Rise, Sub-Antarctic, Southland), RSK 7 (Challenger), and RSK 8 (Central Egmont, Auckland West).**

## 2. BIOLOGY

Little is known about the reproductive biology of rough skates. Rough skates reproduce by laying yolky eggs, enclosed in leathery cases, on the seabed. Rough skates lay their eggs in spring-summer (Francis 1997). Two eggs are laid at a time, but the number of eggs laid annually by a female is unknown. A single embryo develops inside each egg case and the young hatch at about 10–15 cm pelvic length (body length excluding the tail) (Francis 1997).

Rough skates grow to at least 79 cm pelvic length, and females grow larger than males. The greatest

reported age is 9 years for a 70 cm pelvic length female, and females may live longer than males (Francis et al 2001a, b). There are no apparent differences in growth rate between the sexes. Males reach 50% maturity at about 52 cm and 4 years, and females at 59 cm and 6 years. The most plausible estimate of *M* is 0.25–0.35. Biological parameters relevant to stock assessment are shown in Table 4.

**Table 4: Estimates of biological parameters for Rough skates (RSK).**

| Fishstock | | | Estimate | Source |
|---|---|---|---|---|
| 1. Natural mortality (M) | | | | |
| RSK 3 | | | 0.25–0.35 | Francis et al (2001b) |
| 2. Weight = a (length) $^{b}$ (weight in g, length in cm pelvic length) | | | | |
| | | a | b | |
| RSK males | | 0.0393 | 2.838 | Francis (1997) |
| RSK females | | 0.0218 | 3.001 | Francis (1997) |
| 3. von Bertalanffy growth parameters | | | | |
| | *K* | $t_0$ | $L_\infty$ | |
| RSK 3 (both sexes) | 0.16 | -1.2 | 91.3 | Francis et al (2001b) |
| RSK 3 (both sexes) | 0.096 | -0.78 | 151.8 | Francis et al (2004) |

## 3. STOCKS AND AREAS

Nothing is known about stock structure or movement patterns in skates. Rough skates are distributed throughout most of New Zealand, from the Three Kings Islands to Campbell Island and the Chatham Islands, including the Challenger Plateau, Chatham Rise and Bounty Plateau. Rough skates have not been recorded from QMA 10.

In this report, rough skate landings have been presented by QMA. QMAs would form appropriate management units in the absence of any information on biological stocks.

## 4. STOCK ASSESSMENT

This is the first stock assessment for skates. No yield estimates have been made for skates.

### 4.1 Estimates of fishery parameters and abundance

Relative biomass estimates are available for rough skates from a number of trawl survey series (Table 5). Biomass estimates are not provided for surveys of: (a) west coast North Island because of major changes in survey areas and strata during the series; or (b) east Northland, Hauraki Gulf and Bay of Plenty because of the low relative biomass of rough skates present (usually less than 100 t). In the first survey of each of two series -east coast South Island and Chatham Rise- the two skate species were not (fully) distinguished. Furthermore, there are doubts about the accuracy of species identification in some other earlier surveys (prior to 1996). Consequently, trends in biomass of individual species must be interpreted cautiously. To enable comparison among all surveys within each series, total skate biomass is also reported.

As the catch from the South Island trawl surveys changes without wide inter-annual fluctuations and the CVs are relatively low it appears that they are able to track rough skate biomass in FMA 3, 7, and on the Stewart Snares. West Coast South Island surveys show that the relative biomass of rough skate in FMA 7 declined in the early 2000s but has since increased marginally.

### 4.2 Biomass estimates

#### 4.2.1 Trawl Surveys

Indices of relative biomass are available from recent *Tangaroa* and *Kaharoa* trawl surveys of the Chatham Rise, East Coast South Island and West Coast South Island (Table 5, and Figures 2–3).

Estimates of biomass for RSK from Chatham Rise and WCSI trawl surveys are provided in Figure 2. Although CVs are reasonably large, biomass appears to have fluctuated without trend for both surveys since the early 1990s.

## ECSI trawl surveys

The East Coast South Island winter surveys from 1991 to 1996 (30–400 m) were replaced by summer trawl surveys (1996–97 to 2000–01) which also included the 10–30 m depth range; but these were discontinued after the fifth in the annual time series because of the extreme fluctuations in catchability between surveys (Francis et al. 2001). The winter surveys were reinstated in 2007, and this time were expanded to include the 10–30 m depth range, in order to monitor elephant fish and red gurnard. Prior to 2014, only the 2007 and 2012 surveys provided full coverage of the 10–30 m depth range.

The 2016 RSK biomass estimate in the core strata (30–400 m) for the east coast South Island trawl survey was only slightly less than that in 2014, which was the highest in the time series and more than double that of the highest biomass estimate of the 1990s (Figure 3). The additional biomass captured in the 10–30 m depth range accounted for 30%, 20%, 38% and 27%, of the biomass in the core plus shallow strata (10–400 m) for 2007, 2012, 2014, and 2016 respectively, indicating that in terms of biomass, it is essential to monitor the core plus shallow strata (10–400 m).

The rough skate length distributions for the east coast South Island winter trawl surveys core strata (30–400 m) have no clear modes, comprise multiple year classes, and very small skate tend to be found in shallow water (Beentjes et al 2015, 2016). The survey appears to be monitoring pre-recruited lengths down to 1+ age and the full recruited distribution, but no individual cohorts are discernible. Length frequency distributions are reasonably consistent among surveys with no lengths measured before 1996. The addition of the 10–30 m depth range has changed the shape of the length frequency distribution only slightly with more smaller skate present (Beentjes et al 2015, 2016).

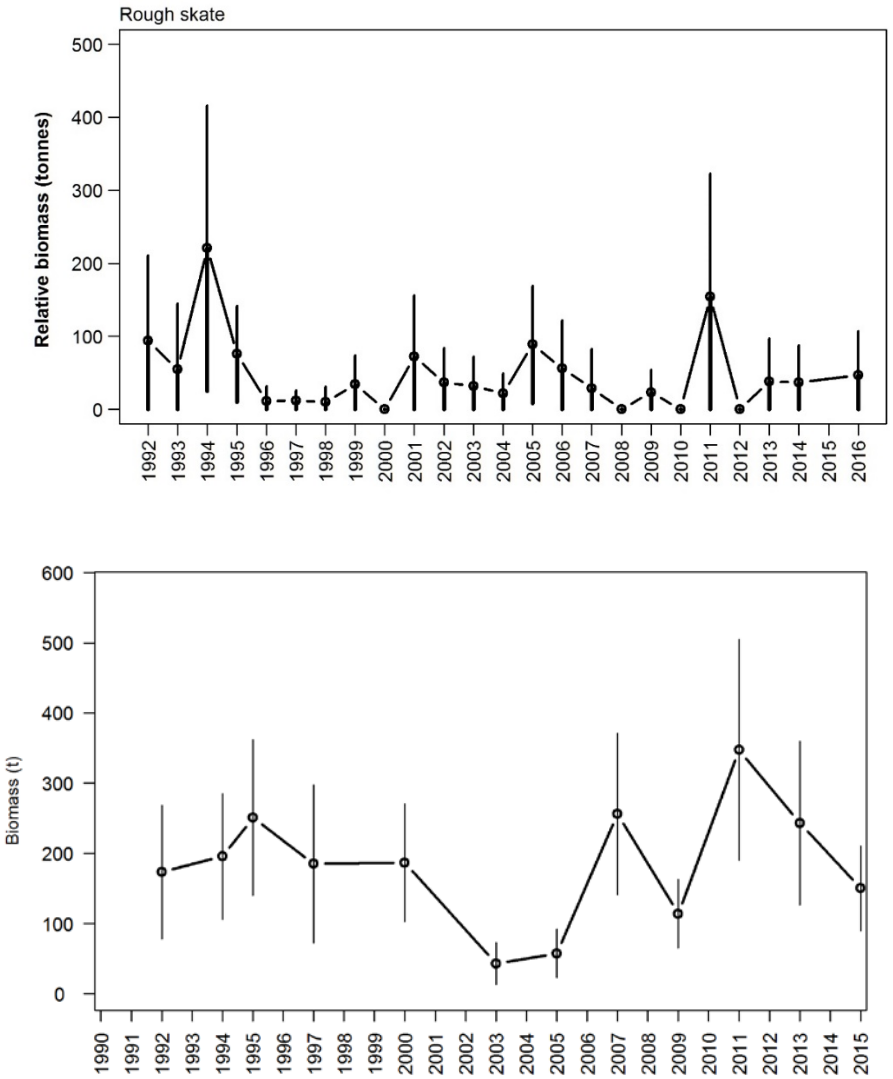



**Figure 2: Rough skate biomass for the Chatham Rise (top) and west coast South Island inshore (bottom) trawl survey time series (error bars are ± two standard errors).**

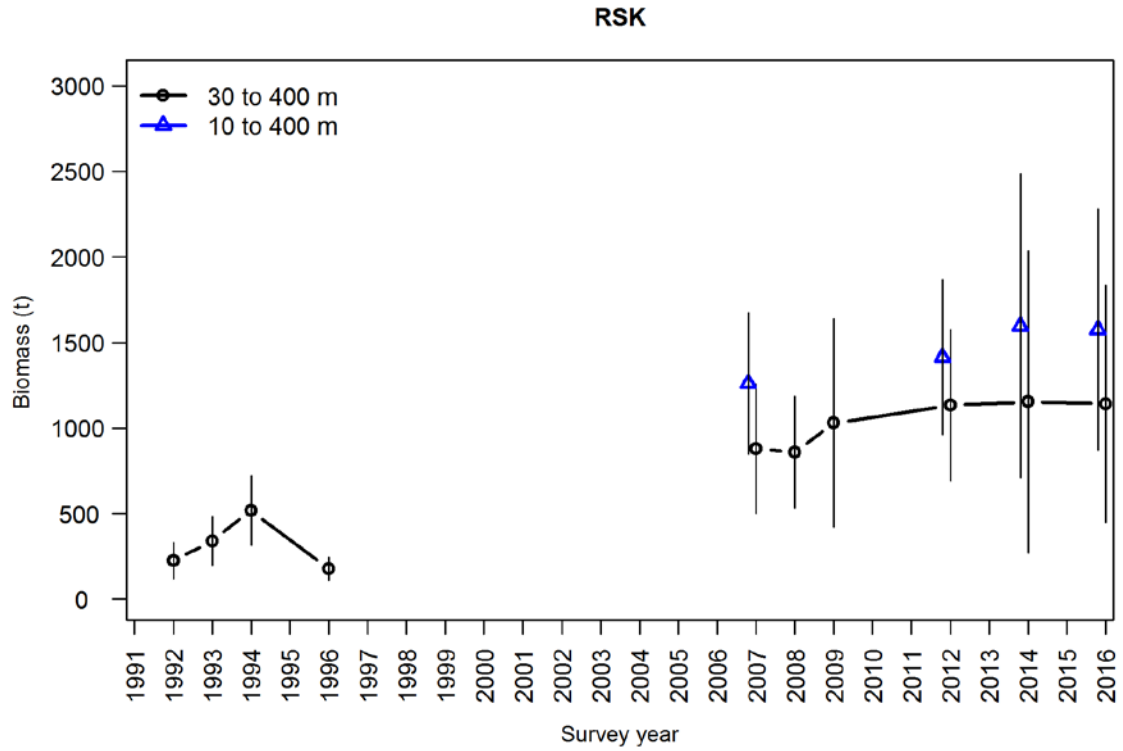



**Figure 3: Rough skate total biomass for the ECSI winter surveys in core strata (30–400 m), and core plus shallow strata (10–400 m). Error bars are ± two standard errors.**

## 4.3 Yield estimates and projections

*MCY* cannot be estimated.

The *MCY* estimator that has the lowest data requirements ($MCY = cY_{AV}$; Method 4), relies on selecting a time period during which there were "no systematic changes in fishing mortality (or fishing effort, if this can be assumed to be proportional to fishing mortality)". This method was not applied because no information is currently available on skate fishing mortality, or on trawl fishing effort in the main skate fishing areas.

*CAY* cannot be estimated.

## 4.4 Other factors

Species that constitute a minor bycatch of trawl fisheries are often difficult to manage using TACCs and ITQs. Skates are widely and thinly distributed, and would be difficult for trawlers to avoid after the quota had been caught. A certain level of incidental bycatch is therefore inevitable. However, skates are relatively hardy, and frequently survive being caught in trawls (though mortality would depend on the length of the tow and the weight of fish in the cod end). Skates returned to the sea alive probably have a greater chance of survival than most other fishes.

**Table 5: Doorspread biomass estimates (t) and coefficients of variation (CV %) of rough skates and total skates (both rough and smooth).**

| | | Rough skate | | Total skates | | | |
|---|---|---|---|---|---|---|---|
| Year | Trip Code | Biomass | CV | Biomass | CV | Biomass | Rough skate CV (%) |
| East coast North Island | | | | | | | |
| 1993 | KAH9304 | 76 | 28 | 99 | - | - | - |
| 1994 | KAH9402 | 189 | 12 | 333 | - | - | - |
| 1995 | KAH9502 | 52 | 20 | 72 | - | - | - |
| 1996 | KAH9602 | 309 | 24 | 394 | - | - | - |
| West coast South Island and Tasman/Golden Bays | | | | | | | |
| 1992 | KAH9204 | 173 | 27 | 512 | - | - | - |
| 1994 | KAH9404 | 196 | 23 | 537 | - | - | - |
| 1995 | KAH9504 | 251 | 22 | 566 | - | - | - |

**Table 5: [Continued]**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1997 | KAH9701 | 185 | 30 | 487 | - | - | - |
| 2000 | KAH0004 | 186 | 23 | 326 | - | - | - |
| 2003 | KAH0304 | 43 | 34 | 134 | - | - | - |
| 2005 | KAH0503 | 58 | 30 | 138 | - | - | - |
| 2007 | KAH0704 | 256 | 23 | 300 | - | - | - |
| South Island west coast and Tasman/Golden Bays (FMA 7) | | | | | | | |
| 2009 | KAH0904 | 114 | 21 | 181 | - | - | - |
| 2011 | KAH1104 | 347 | 23 | 532 | - | - | - |
| 2013 | KAH1305 | 243 | 24 | 431 | - | | |
| 2015 | KAH1503 | 150 | 20 | 492 | - | | |
| East coast South Island (FMA 3) | | | | | | | |
| Winter | | | 30–400 m | | 30–400 m | | 10–400 m |
| 1991 | KAH9105 | - | - | 1928 | 25 | - | - |
| 1992 | KAH9205 | 224 | 24 | 829 | 16 | - | - |
| 1993 | KAH9306 | 335 | 21 | 993 | 21 | - | - |
| 1994 | KAH9406 | 517 | 20 | 823 | 15 | - | - |
| 1996 | KAH9606 | 177 | 19 | 562 | 18 | - | - |
| 2007 | KAH0705 | 878 | 22 | 1 580 | - | 1 261 | 16 |
| 2008 | KAH0806 | 858 | 19 | 1 412 | - | - | - |
| 2009 | KAH0905 | 1 029 | 30 | 1 765 | - | - | - |
| 2012 | KAH1207 | 1 113 | 20 | 2 138 | - | 1 414 | 16 |
| 2014 | KAH1402 | 1 153 | 38 | 1 790 | - | 1 597 | 28 |
| | KAH1605 | 1 142 | 30 | 1 805 | - | 1 576 | 22 |
| East coast South Island (FMA 3) Summer | | | | | | | |
| 1996–97 | KAH9618 | 1 336 | 15 | 2 057 | - | - | - |
| 1997–98 | KAH9704 | 1 082 | 13 | 1 567 | - | - | - |
| 1998–99 | KAH9809 | 1 175 | 10 | 1 625 | - | - | - |
| 1999–00 | KAH9917 | 329 | 23 | 698 | - | - | - |
| 2000–01 | KAH0014 | 222 | 34 | 470 | - | - | - |
| Chatham Rise | | | | | | | |
| 1991–92 | TAN9106 | - | - | 2 129 | - | - | - |
| 1992–93 | TAN9212 | 55 | 83 | 1 126 | - | - | - |
| 1994 | TAN9401 | 220 | 44 | 1 178 | - | - | - |
| 1995 | TAN9501 | 76 | 43 | 845 | - | - | - |
| 1996 | TAN9601 | 11 | 100 | 1 522 | - | - | - |
| 1997 | TAN9701 | 12 | 58 | 1 944 | - | - | - |
| 1998 | TAN9801 | 10 | 100 | 1 935 | - | - | - |
| 1999 | TAN9901 | 34 | 60 | 1 772 | - | - | - |
| 2000 | TAN0001 | 0 | - | 1 369 | - | - | - |
| 2001 | TAN0101 | 72 | 59 | 2 393 | - | - | - |
| 2002 | TAN0201 | 37 | 65 | 2 148 | - | - | - |
| 2004 | TAN0401 | 22 | 60 | 2 066 | - | - | - |
| 2005 | TAN0501 | 89 | 45 | 1 869 | - | - | - |
| 2006 | TAN0601 | 56 | 45 | 1 577 | - | - | - |
| 2007 | TAN0701 | 29 | 56 | 1 951 | - | - | - |
| 2008 | TAN0801 | 0 | - | 1 376 | - | - | - |
| 2009 | TAN0901 | 23 | 67 | 1 185 | - | - | - |
| 2010 | TAN1001 | - | - | 1 576 | - | - | - |
| 2011 | TAN1101 | - | - | 1 009 | - | - | - |
| 2012 | TAN1201 | - | - | 813 | - | - | - |
| 2013 | TAN1301 | 38 | 78.5 | | | | |
| 2014 | TAN1401 | 37 | 69.1 | | | | |
| 2016 | TAN1601 | 47 | 64.7 | | | | |
| Stewart-Snares Shelf | | | | | | | |
| 1993 | TAN9301 | 592 | 20 | 1 120 | - | - | - |
| 1994 | TAN9402 | 1 064 | 15 | 1 406 | - | - | - |
| 1995 | TAN9502 | 801 | 7 | 1 136 | - | - | - |
| 1996 | TAN9604 | 1 055 | 11 | 1 559 | - | - | - |
| Survey discontinued | | | | | | | |
| Stewart-Snares Shelf and Sub-Antarctic (Summer)* | | | | | | | |
| 1991 | TAN9105 | 37 | 72 | 419 | - | - | - |
| 1992 | TAN9211 | 52 | 69 | 165 | - | - | - |
| 1993 | TAN9310 | 132 | 57 | 249 | - | - | - |
| 2000 | TAN0012 | 201 | 56 | 267 | - | - | - |
| Stewart-Snares Shelf and Sub-Antarctic (Autumn) | | | | | | | |
| 1992 | TAN9204 | 48 | 100 | 141 | - | - | - |
| 1993 | TAN9304 | 251 | 57 | 428 | - | - | - |
| 1996 | TAN9605 | 22 | 71 | 857 | - | - | - |
| 1998 | TAN9805 | 71 | 77 | 607 | - | - | - |

*Biomass estimates are for core 300–800 m strata only

A data informed qualitative risk assessment was completed on all chondrichthyans (sharks, skates, rays and chimaeras) at the New Zealand scale in 2014 (Ford et al 2015). Rough skate was ranked number one (highest) in terms of risk of the eleven QMS chondrichthyan species. Data were described as existing but poor for the purposes of the assessment and consensus over this risk score was achieved by the expert panel. This risk assessment does not replace a stock assessment for this species but may influence research priorities across species.

## 5. STATUS OF THE STOCKS

No estimates of current and reference biomass are available.

## 6. FOR FURTHER INFORMATION

Beentjes, M P (2005) Identification and reporting of commercial skate landings. *New Zealand Fisheries Assessment Report 2005/16*. 18 p.

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Beentjes, M P; MacGibbon, D; Lyon, W S (2015) Inshore trawl survey of Canterbury Bight and Pegasus Bay, April–June 2014 (KAH1402). *New Zealand Fisheries Assessment Report 2015/14*. 136 p.

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