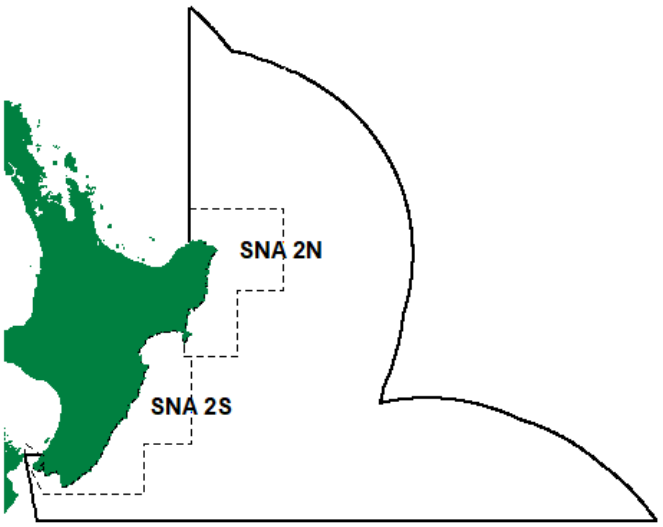
SNAPPER (SNA 2)

(*Chrysophrys auratus*)
Tamure, Kouarea



1. FISHERIES SUMMARY

1.1 Commercial fisheries

Table 1 and Table 2 provide a summary of the reported commercial catches, TACCs, and TACs for SNA 2. Landings and TACCs are plotted in Figure 1.

Table 1: Reported landings (t) of snapper from SNA 2 from 1931 to 1990.

Year	Landings (t)	Year	Landings (t)	Year	Landings (t)
1931–32	0	1951	265	1971	861
1932–33	0	1952	220	1972	878
1933–34	21	1953	247	1973	798
1934–35	168	1954	293	1974	716
1935–36	149	1955	309	1975	732
1936–37	78	1956	365	1976	732
1937–38	114	1957	452	1977	374
1938–39	122	1958	483	1978	454
1939–40	100	1959	372	1979	662
1940–41	103	1960	487	1980	636
1941–42	148	1961	589	1981	283
1942–43	74	1962	604	1982	160
1943–44	60	1963	636	1983	160
1944	49	1964	667	1984	227
1945	59	1965	605	1985	208
1946	77	1966	744	1986	255
1947	36	1967	856	1987	122
1948	53	1968	765	1988	165
1949	215	1969	837	1989	227
1950	285	1970	804	1990	429

Notes:
1. The 1931–1943 years are April–March but from 1944 onwards are calendar years.
2. The 'QMA totals' are approximations derived from port landing subtotals, as follows: SNA 2 Gisborne to Wellington/Makara
3. Before 1946 the 'QMA' subtotals sum to less than the New Zealand total because data from the complete set of ports are not available.
4. Data up to 1985 are from fishing returns: data from 1986 to 1990 are from Quota Management Reports.
5. Data for the period 1931 to 1982 are based on reported landings by harbour and are likely to be underestimated as a result of under-reporting and discarding practices. Data include both foreign and domestic landings.

In SNA 2, snapper is primarily caught as a bycatch of the tarakihi and gurnard bottom trawl fisheries and, more intermittently, in the gurnard target Danish seine fishery. From 1 October 2002, the TACC for SNA 2 was increased from 252 t to 315 t, within a total TAC of 450 t (Table 3). Nevertheless the 315 t TACC has regularly been over-caught since 1987–88, except in the fishing years 2008–09 to 2009–10 and 2012–13 to 2014–15. The minimum legal size (MLS) for snapper in SNA 2 is 25 cm.

Table 2: Reported landings (t) of snapper from SNA 2 from 1983–84 to present and gazetted and actual TACCs (t) for 1986–87 to present. QMS data from 1986–present.

Fishstock	SNA 2	
FMAs	2	
	Landings	TACC
1983–84†	145	–
1984–85†	163	–
1985–86†	177	–
1986–87	130	130
1987–88	152	137
1988–89	210	157
1989–90	364	157
1990–91	428	157
1991–92	373	157
1992–93	324	252
1993–94	307	252
1994–95	308	252
1995–96	280	252
1996–97	351	252
1997–98	286	252
1998–99	283	252
1999–00	390	252
2000–01	360	252
2001–02	252	252
2002–03	334	315
2003–04	339	315
2004–05	399	315
2005–06	389	315
2006–07	329	315
2007–08	328	315
2008–09	307	315
2009–10	296	315
2010–11	320	315
2011–12	358	315
2012–13	310	315
2013–14	313	315
2014–15	271	315
2015–16	321	315
2016–17	373	315
2017–18	373	315
2018–19	364	315
2019–20	330	315
2020–21	321	315
2021–22	337	315
2022–23	339	315

† FSU data. SNA 2 = Statistical Areas 011–016

Table 3: TACs, TACCs, and allowances (t) for SNA 2 from 1 October 2021.

Fishstock	TAC	TACC	Customary allowance	Recreational allowance	Other mortality
SNA 2	450	315	14	90	31

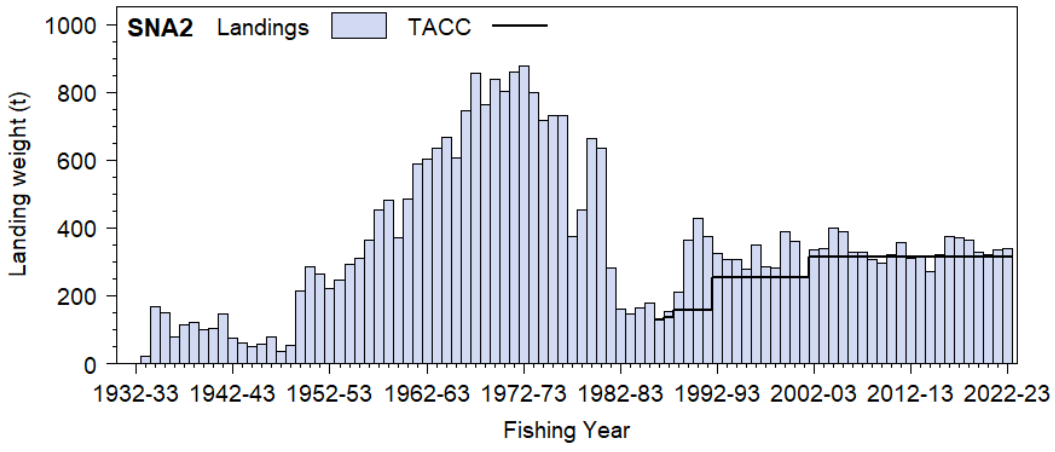


Figure 1: Total reported landings and TACCs for SNA 2.

1.2 Recreational fisheries

The snapper fishery is the largest recreational fishery in New Zealand. It is the major target species on the northeast and northwest coasts of the North Island and is targeted seasonally around the rest of the North Island and the top of the South Island. The current allowance within the SNA 2 TAC is shown in Table 3.

1.2.1 Management controls

The two main methods used to manage recreational harvests of snapper are minimum legal size limits (MLS) and daily bag limits. Both have changed over time (Table 4). The number of hooks permitted on a recreational longline was reduced from 50 to 25 in 1995.

Table 4: Changes to minimum legal size limits (MLS) and daily bag limits used to manage recreational harvesting levels in SNA 2.

Stock	MLS	Bag limit	Introduced
SNA 2	25	30	1/01/1985
SNA 2	27	10	1/10/2005

1.2.2 Estimates of recreational harvest

A background to the estimation on recreational harvest of snapper is provided in the Introduction – Snapper chapter. Recreational harvest estimates for SNA 2 are provided in Table 5a. Partitioned between the SNA 2 sub-areas, the 2017–18 panel survey provides estimates of recreational harvest from SNA 2N of 35 t and SNA 2S of 58 t (Bruce Hartill, NIWA, pers. comm.).

Table 5a: Recreational catch estimates for SNA 2. Totals for a stock are given in bold. The telephone/diary surveys ran from December to November but are denoted by the January calendar year. Mean fish weights were obtained from boat ramp surveys (for the telephone/diary and panel survey catch estimates). Numbers and mean weights are not calculated in the tag ratio method. Amateur charter vessel (ACV) and recreational take from commercial vessels under s111 general approvals as reported, with Total the sum of NPS, ACV and s111. ACVs have only been required to report harvest for SNA since 2020–21.

			Harvest survey					
Stock	Year	Method	Number of fish (0000s)	Estimate (t)	CV	ACV (t)	s111 (t)	Total (t)
SNA 2								
Total	1993	Telephone/diary	28	**36**	–			
Total	1996	Telephone/diary	31	**40**	–			
Total	2000	Telephone/diary	268	**322**	–			
Total	2001	Telephone/diary	144	**173**	–			
Total	2011–12	Panel survey	55	**57**	**0.25**	**0.5**	**0.7**	**57.7**
Total	2017–18	Panel survey	82	**91**	**0.24**	**0.9**	**0.8**	**93.1**
Total	2022–23	Panel survey	88	**116**	**0.25**	**4.4**	**1.1**	**121.9**

Web camera/creel survey monitoring has been undertaken within SNA 2 since 2014–15 (monitoring at Napier and Gisborne). These data show a generally increasing trend in snapper catch rate, but also need to be scaled to fishing effort and the National Panel Survey estimates (2017–18 and 2022–23) in an agreed way (still to be determined) to generate annual harvest estimates (Table 5b).

Table 5b: Preliminary recreational catch rate estimates (kg.trip) from web camera/creel survey monitoring and of National Panel Survey harvest estimates (including charter trip records) for SNA 2, split by SNA 2N and SNA 2S .

	SNA 2N		SNA 2S	
Year	Catch rate (kg.trip)	NPS (t)	Catch rate (kg.trip)	NPS (t)
2011–12		30.3		27.0
2012–13				
2013–14				
2014–15	0.84		1.68	
2015–16	0.95		2.09	
2016–17	1.09		2.48	
2017–18	2.27	35.2	3.54	57.9
2018–19	1.91		4.49	
2019–20	1.77		2.61	
2020–21	2.50		4.31	
2021–22	1.37		2.72	
2022–23	2.03	40.3	5.23	80.0

1.3 Customary non-commercial fisheries

Snapper form important fisheries for customary non-commercial fisheries, but the annual catch is not known. The information on Māori customary harvest under the provisions made for customary fishing is limited and it is likely that Māori customary fishers utilise the provisions under recreational fishing regulations.

1.4 Illegal catch

No new information is available to estimate illegal catch.

1.5 Other sources of mortality

With the introduction of Electronic Reporting in 2019, commercial fishers must provide comprehensive reporting of all discards and returns. All fish under the minimum legal size ("sub-MLS fish") must be returned to the sea; in SNA 2 reported quantities of sub-MLS snapper have been small (1–3 t in 2020 and 2021).

2. BIOLOGY

For further information on snapper biology refer to the Introduction – Snapper chapter. A summary of published estimates of biological parameters for SNA 2 is presented in Table 6.

Table 6: Estimates of biological parameters.

Fishstock	Estimate			Source
1. Instantaneous rate of natural mortality (M)				
SNA 1, 2, 7, & 8	0.075			Hilborn & Starr (unpub. analysis)
2. Weight = a(length)^b (Weight in g, length in cm fork length)				
All	a = 0.04467		b = 2.793	Paul (1976)
3. von Bertalanffy growth parameters				
	Both sexes combined			
	K	t_0	L_∞	
SNA 2N	0.027	-8.85	98.7	Walsh et al (2012)
SNA 2S	0.097	-2.02	71.7	Walsh et al (2012)

3. STOCKS AND AREAS

A review of catch at age data collected from SNA 2 in 2008 and 2009 found differences in length and age structure, year class strength and growth for snapper in northern and southern subareas of SNA 2 (Walsh et al 2012). The boundary between the areas was defined as the Mahia Peninsula, with most catch from the northern area landed and sampled in Gisborne, and from the southern area in Napier. Previously genetic sampling (Smith et al 1978) suggested that snapper in Hawke Bay were genetically more similar to snapper on the west coast of the North Island than other east coast snapper, and that there was an indication of stock mixing at East Cape between the Bay of Plenty and northern SNA 2. Whole-genome genetic analyses have confirmed that there are two major genetic groupings of snapper in New Zealand (Oosting 2021). Snapper sampled from recreational fisheries in Napier and Gisborne tended to group with snapper from SNA 7 and SNA 8, while snapper from north of East Cape grouped with SNA 1. No samples were obtained between Gisborne and East Cape. Walsh et al (2012) concluded that there was evidence, based on nursery areas, growth rates and year class strength, that the northern and southern areas in SNA 2 represented separate sub-stocks with minor level of mixing and migration occurring between the northern area of SNA 2 and the Bay of Plenty, similar to that seen between the sub-stocks of SNA 1.

4. STOCK ASSESSMENT

A full quantitative stock assessment was completed for SNA 2 in 2009 (Langley 2010). This assessment is not reported here because it assumed that SNA 2 comprised a single biological stock and the Plenary gave it a quality ranking of '2' at the time of review. In 2017, standardised CPUE indices for the two sub-stocks were derived using data from the mixed target bottom trawl fishery for the recent period of the fishery; these have been updated periodically and CPUE-based reference points have been adopted for SNA 2S.

4.1 Standardised CPUE

In 2017, Schofield et al (2018a) completed a standardised CPUE analysis for the two sub-stocks of SNA 2 using commercial catch and effort data from the bottom trawl fishery. Two CPUE series were considered: vessel-day records aggregated to pseudo-CELR resolution (Langley 2014); and tow by tow records from 2008 onwards. Due to changes in regulations and reporting behaviour between 1989–90 and 2001–02, data from this period were excluded from the vessel-day analysis. Throughout this period the SNA 2 TACC was consistently over-caught, in 2000 Annual Catch Entitlement was introduced, in 2001 differential deemed values were introduced, and in 2002 the SNA 2 TACC was increased to 325 t.

The boundary between the northern and southern sub-stocks was assumed to lie off the southern tip of Mahia Peninsula, splitting Statistical Area 013 into Eastern and Western sub-areas at 177.87° E. A classification partitioning model was used to allocate catch and effort reported from Statistical Area 013 on CELR forms to one of the two sub-stocks, trained using high-resolution data from 2007–08 to 2015–16. The partition tree used landing port for the primary split and then target species as a secondary split when landing port was not Auckland, Gisborne, or Tauranga. Actual area (013W or 013E) was correctly assigned for 88.9% of records in the training dataset.

A Generalised Linear Modelling (GLM) approach was applied to separately model the occurrence of snapper catches (presence/absence) and the magnitude of positive snapper catches; these were combined to produce the final series. The presence/absence of snapper catch was modelled based on a binomial distribution. The dependent variable of the catch magnitude CPUE models was the natural logarithm of catch, and the error structure was chosen following an evaluation of alternative distributions.

The Inshore WG adopted the combined vessel day CPUE indices as indices of abundance for the SNA 2 sub-stocks in 2017. These indices were updated in 2018 (Schofield et al 2018b) to include data to 30 September 2017, and again in 2022 with minor modifications (Middleton 2024).

The series were further updated in 2024 with data to 30 September 2023, using lognormal distributions for the vessel-day positive catches and Weibull distributions for the tow by tow series (Middleton 2024). Data included in the event-based series for SNA 2S were limited to Hawke Bay, defined as Statistical Area 013 west of 177.87° E and Statistical Area 014 north of 39.65° S, as a result of evidence that catches of snapper off the coast south of Hawke Bay (within Statistical Area 014) had a disproportionate influence on the indices.

The daily series for the northern sub-stock initially increased from 2002 to 2003, declined from 2003 to 2010 then, following a period of stability from 2010 to 2016, increased steadily to 2023 (Figure 2). The southern sub-stock was stable from 2002 to 2007, dropped to a lower level from 2008 to 2016, before increasing sustantially to 2023.

The event-based series, beginning in 2008, show very similar trends to the daily series for the common years (Figure 2). Trends in abundance in the northern and southern areas are generally similar, but the variation in SNA 2S has been greater, with lower relative abundance from 2013 to 2016, and reaching higher relative abundance in the early 2000s, and in 2023.

Unstandardised recreational harvest rates from creel surveys at boat ramps in Gisborne and Napier showed similar trends to commercial CPUE from 2015 to 2021 but did not increase in 2022 and 2023 (Figure 3).

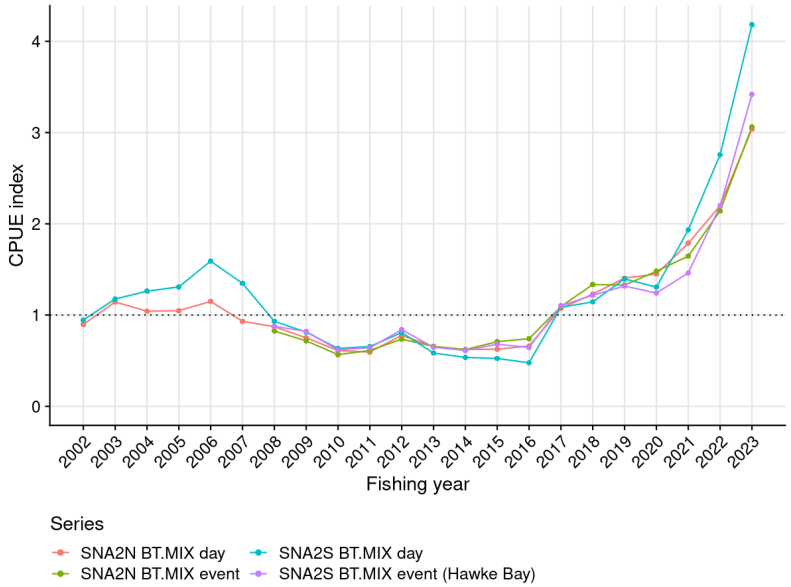


Figure 2: Comparison of standardised combined catch per unit effort (CPUE) indices for the northern and southern sub-stocks of SNA 2 from bottom trawling targeting gurnard, snapper, tarakihi, and trevally combined over all form types and aggregated to CELR resolution (BT.MIX day), and from data reported at the event level (BT.MIX event). Series are scaled relative to the geometric mean of the years they have in common. Fishing years are labelled according to the second calendar year, e.g., 2002 = 2001–02.

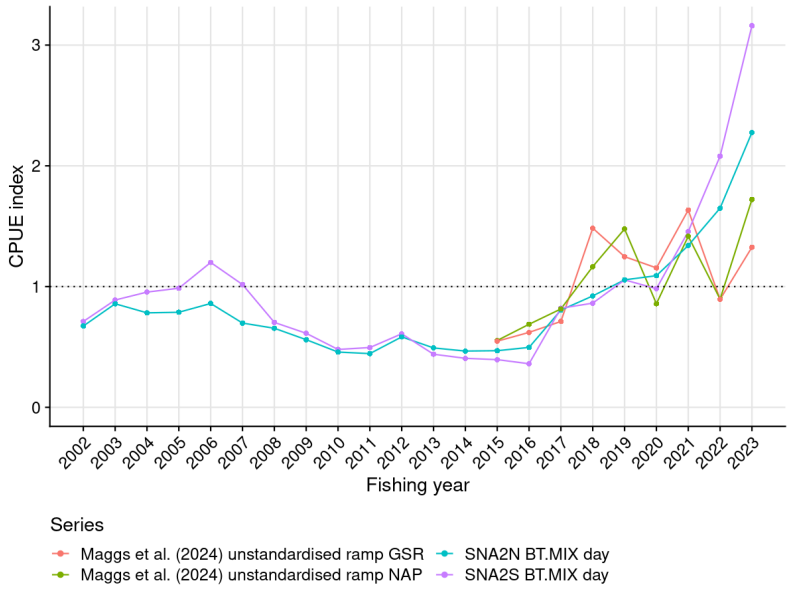


Figure 3: Comparison of standardised combined catch per unit effort (CPUE) indices for the northern and southern sub-stocks of SNA 2 from bottom trawling targeting gurnard, snapper, tarakihi, and trevally combined over all form types and aggregated to CELR resolution (BT-MIX daily) with unstandardised recreational harvest rates from monitoring of boat ramps in Gisborne (GSR) and Napier (NAP). Fishing years are labelled according to the second calendar year, e.g., 2002 = 2001–02.

Establishing B_{MSY} compatible reference points

In 2022, the Inshore Working Group adopted geometric mean standardised CPUE from the BT-MIX event-resolution model for the period 2008 to 2012 as the soft limit reference point for SNA 2S. This period had stable catch and standardised CPUE. The historical catch suggested that the stock was at a low point in the early 1980s. The longer daily resolution index (beginning in 2002) indicated that the stock was higher prior to the reference period, but it was thought that it was unlikely it had recovered to be substantially higher than the target by that time. The Working Group adopted the default Harvest Strategy Standard definitions for the target and hard limit of twice and half the soft limit, respectively.

In 2024 the Plenary chose to adopt the Hawke Bay only series [SNA2S BT.mix event (Hawke Bay)] as the reference series, because this avoids disproportionate influence on the indices arising from potential range expansion in areas at the limits of the normal stock distribution. The reference period for defining the soft limit was not changed.

No reference point was adopted for SNA 2N in 2024, because there remains uncertainty regarding the degree of stock relationship with the eastern Bay of Plenty.

4.2 Catch at age data

Seven years of age frequency data were available from the commercial fisheries for the 2009 assessment. There was considerable variability in the age compositions among years, likely due in part to the sampling of the snapper bycatch from a number of different target fisheries. The age compositions were principally composed of younger age classes and few old fish were sampled from the catch. There are concerns regarding the representative nature of the sampling and comparability of the ageing in earlier years.

A further commercial catch sampling programme was conducted in the 2007–08 and 2008–09 fishing years (Walsh et al 2012). The study found evidence for two sub-stocks within SNA 2: a northern stock located between Mahia Peninsula and Cape Runaway, and a southern stock within Hawke Bay. Walsh et al (2012) demonstrated that, although strong year classes were consistent between stocks, a range of year classes were present in the northern area (similar to the eastern Bay of Plenty), whereas the southern area was dominated by a few strong year classes. Snapper from the southern sub-stock grew considerably faster than those from the northern sub-stock weighing 50–60% more at any given age.

Catch sampling was carried out in 2020, in the northern subarea only. Results suggest a higher proportion of 20+ fish in 2020 than in 2008 and 2009. Results from catch sampling in SNA 2N in 2022–23 suggested further broadening of the age distribution, with a strong 2015 year class evident in both 2019–20 and 2022–23, and an indication in the 2022–23 sampling of a strong 2019 year class entering the fishery (Figure 4).

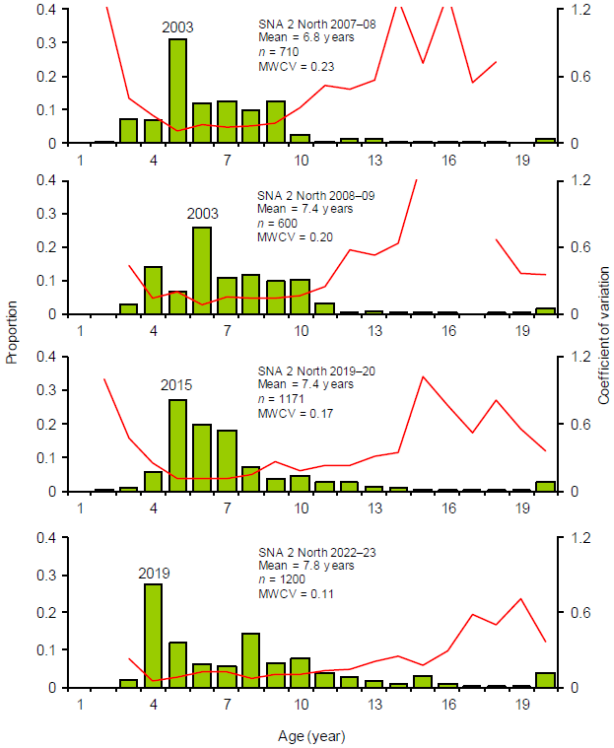


Figure 4 Age distributions of snapper in the SNA 2N bottom trawl fisheries in 2007–08, 2008–09, 2019–20 and 2022–23.

Future research considerations

- Extend whole genome sequencing analysis by including additional samples between Mahia and Cape Runaway to resolve stock relationships between SNA2S, SNA2N and eastern BoP.
- Catch sampling in both northern and southern areas is required to allow similarities and differences in year class strengths to be assessed for years other than 2008 and 2009, and to establish whether changes in growth rates observed in other snapper fisheries have also occurred in SNA 2. This should be conducted in conjunction with sampling within the Bay of Plenty.
- The pre-QMS catch history for SNA 2 requires partitioning between the northern and southern areas.
- Refine the CPUE series, including investigating the effect of splitting vessels that have been in the core fleet for long periods, or have gaps in participation; use a 'top 8' event-resolution model with TCER and ERS-Trawl data only; drop trevally target data.
- Further explore the wider area (SNA 2 and Bay of Plenty) CPUE model to investigate stock relationships between SNA 1 and SNA 2
- Explore any additional snapper tagging data as it comes available (e.g., Tindale Marine Research Charitable Trust data) to investigate fish movement.

5. STATUS OF THE STOCKS

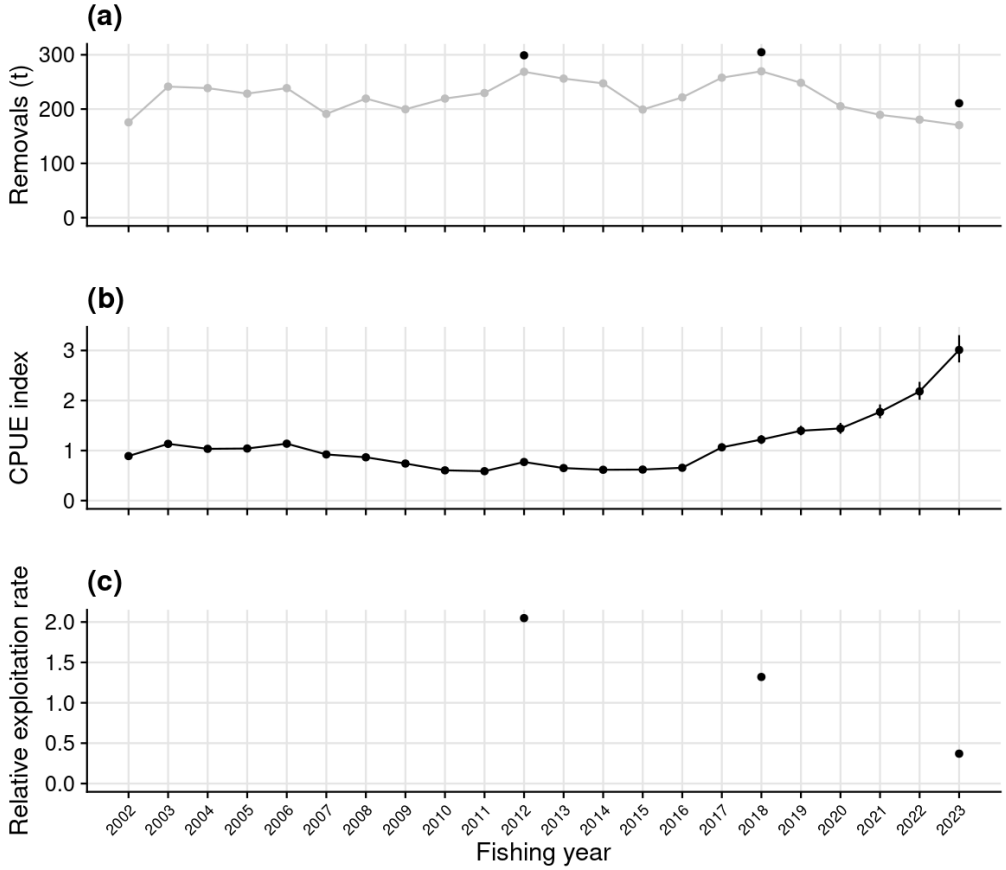
Stock Structure Assumptions

SNA 2 is assumed to occur in two sub-stocks. The northern sub-stock occurs between the southern tip of the Mahia Peninsula and Cape Runaway and may be associated with the SNA 1 Bay of Plenty stock. The southern sub-stock occurs mainly within Hawke Bay and is genetically linked to SNA 7 and SNA 8.

SNA 2N

Stock Status		
Most Recent Assessment Plenary Publication Year	2024	
Catch in most recent year of assessment	Year: 2022–23	Catch: 210 t (170 t commercial, 40 t recreational)
Assessment Runs Presented	Standardised combined CPUE (positive + binomial) model based on daily aggregated SNA, TRE, GUR, and TAR target single trawl data up to 2022–23	
Reference Points	Target: B_{MSY}-compatible proxy based on CPUE: not determined Soft Limit: 50% of target Hard Limit: 25% of target Overfishing threshold: F_{MSY}	
Status in relation to Target	Unknown	
Status in relation to Limits	Soft Limit: Very Unlikely (< 10%) Hard Limit: Very Unlikely (< 10%) Reference points cannot be determined because of uncertainty about the relationship between SNA 2N and BoP, however relative abundance has increased about 4 times from the low period between 2010 and 2016.	
Status in relation to Overfishing	Unknown	

Historical Stock Status Trajectory and Current Status



(a) Annual commercial (grey) and total (black) removals for SNA 2N; (b) the standardised catch per unit effort (CPUE) index for SNA 2N from trawling targeting gurnard, snapper, tarakihi and trevally (BT.MIX day); and (c) relative exploitation rate (for years for which recreational harvest estimates were available).

Fisheries and Stock Trends	
Recent Trend in Biomass or Proxy	The standardised CPUE index was relatively stable from 2010 to 2016 then roughly quadrupled in the period to 2023.
Recent Trend in Fishing Mortality or Proxy	Relative exploitation rate decreased from 2012 to 2023.
Other Abundance Indices	Unstandardised recreational CPUE from 2015 to 2021 increased three-fold but has fluctuated around this level since.
Trends in Other Relevant Indicators or Variables	The proportion of older fish (> 10yrs) in the annual commercial catch has increased from 2007–08 to 2022–23. Two recent strong year classes were observed in 2015 and 2019. A strong 2003 year class is likely to be contributing to the plus group in 2022–23

Projections and Prognosis	
Stock Projections or Prognosis	The stock biomass is likely to continue to increase at current catches, due to two recent strong year classes.
Probability of Current Catch or TACC causing Biomass to remain below or to decline below Limits	For current (1 October 2023) catch levels: Soft Limit: Very Unlikely (< 10%) Hard Limit: Very Unlikely (< 10%) Unknown for current TACC
Probability of Current Catch or TACC causing overfishing to continue or to commence	Unknown

Assessment Methodology		
Assessment Type	Level 2 – Partial Quantitative Stock Assessment	
Assessment Method	Standardised CPUE	
Assessment Dates	Latest assessment Plenary publication year: 2024	Next assessment: 2027
Overall assessment quality rank	1 – High Quality	
Main data inputs (rank)	- Standardised daily single trawl CPUE index of abundance	1 – High Quality
Data not used (rank)	N/A	
Changes to Model Structure and Assumptions	-	
Major Sources of Uncertainty	-The relationship between SNA 2N and Bay of Plenty snapper is uncertain. Recreational harvest estimates (and therefore estimates of relative exloitation) are only are only available for 3 years, 2012, 2018 and 2023.	

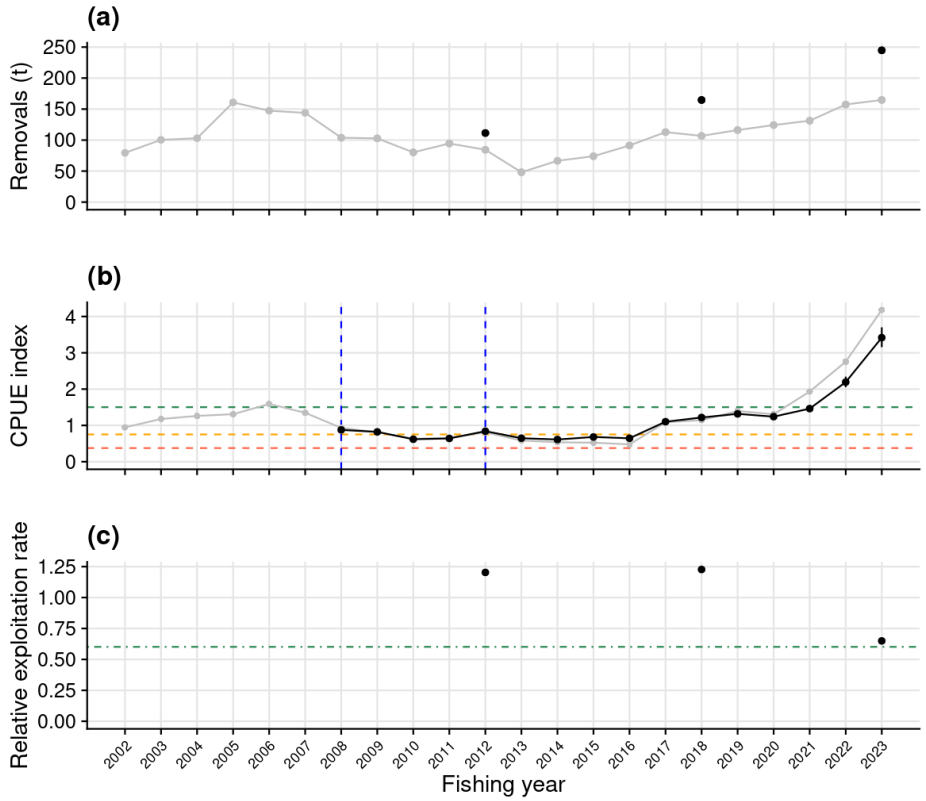
Qualifying Comments
Recreational harvest was 19% of removals in 2023 but the full recreational catch history is not known. The boundary between the SNA 2S and SNA 2N stocks is uncertain.

Fisheries Interactions
Snapper is principally a bycatch of the tarakihi bottom trawl fishery in SNA 2N.

- **SNA 2S**

Stock Status		
Most Recent Assessment Plenary Publication Year	2024	
Catch in most recent year of assessment	Year: 2022–23	Catch: 245 t (165 t commercial, 80 t recreational)
Assessment Runs Presented	Standardised combined CPUE (positive + binomial) model based on event level SNA, TRE, GUR, and TAR target single trawl data up to 2022–23 (Hawke Bay only)	
Reference Points	Target: B_{MSY} proxy (40% B_0) interpreted as twice the geometric mean standardised CPUE from the event resolution model for the period 2008–2012 Soft Limit: geometric mean standardised CPUE in the period 2008–2012 Hard Limit: 50% of the soft limit Overfishing threshold: Half the relative exploitation rate in 2008–2012	
Status in relation to Target	Very Likely (> 90%) to be at or above the target in 2022–23	
Status in relation to Limits	Soft Limit: Very Unlikely (< 10%) to be below Hard Limit: Very Unlikely (< 10%) to be below	
Status in relation to Overfishing	About as Likely as Not (40–60%) that overfishing is occurring.	

Historical Stock Status Trajectory and Current Status



(a) Annual commercial (gray) and total (black) removals for SNA 2S; (b) the standardised event resolution catch per unit effort (CPUE) index (black line), relative to the agreed reference points, for SNA 2S from trawling targeting gurnard, snapper, tarakihi and trevally, and (c) relative exploitation rate . The reference period is indicated by blue vertical dashed lines. Only one exploitation rate value falls within that period. The BT.MIX event index is used to define stock status and is plotted in black in panel (b); the longer BT.MIX day resolution standardised CPUE index is shown in grey.

Fisheries and Stock Trends	
Recent Trend in Biomass or Proxy	The standardised CPUE index was relatively stable from 2010 to 2016 then roughly doubled by 2021, and roughly doubled again by 2023.
Recent Trend in Fishing Mortality or Proxy	The relative exploitation rate decreased between 2018 and 2023
Other Abundance Indices	- Unstandardised recreational CPUE from 2015 to 2019 increased 2.5 times and has fluctuated without trend to 2023.
Trends in Other Relevant Indicators or Variables	-

Projections and Prognosis	
Stock Projections or Prognosis	Unknown
Probability of Current Catch or TACC causing Biomass to remain below or to decline below Limits	Unlikely (<40%) at current catch Unknown for current TACC
Probability of Current Catch or TACC causing overfishing to continue or to commence	Unknown

Assessment Methodology	
Assessment Type	Level 2 – Partial Quantitative Stock Assessment
Assessment Method	Standardised CPUE

Assessment Dates	Latest assessment Plenary publication year: 2024	Next assessment: 2027
Overall assessment quality rank	1 – High Quality	
Main data inputs (rank)	- Standardised single trawl CPUE index of abundance	1 – High Quality
Data not used (rank)	N/A	
Changes to Model Structure and Assumptions	-	
Major Sources of Uncertainty	- Recreational harvest was 33% of removals in 2023 but the full recreational catch history is not known. - Overfishing threshold is based on a single observation. - Recreational harvest estimates (and therefore estimates of relative exloitation) are only are only available for 3 years, 2012, 2018 and 2023.	

Qualifying Comments
The Wairoa Hard, which is understood to be a snapper nursery ground in Hawke Bay, was impacted by land-derived sediments as a result of Cyclone Gabrielle in February 2023. Impacts on snapper recruitment are unknown.

Fisheries Interactions
Snapper is principally a bycatch of the red gurnard bottom trawl fishery in SNA 2S. Anecdotal feedback from fishers indicates that the operation of this fishery is constrained by the SNA 2 TACC.

6. FOR FURTHER INFORMATION

Annala, J H; Sullivan, K J (Comps.) (1997) Report from the Fishery Assessment Plenary, May 1997: stock assessments and yield estimates. 381 p. (Unpublished report held by NIWA library, Wellington.).

Bentley, N; Kendrick, T H (2015). The inshore fisheries of the Central (East) fisheries management area (FMA2): characterisation and catch-per-unit-effort analyses, 1989–90 to 2009–10 Draft New Zealand Fisheries Assessment Report for Research Project INS2009/03. (Unpublished report held by Fisheries New Zealand, Wellington.)

Blackwell, R G; Gilbert, D J (2006) Age composition of commercial snapper landings in SNA 2, 2004–05. *New Zealand Fisheries Assessment Report 2006/46*. 18 p.

Blackwell, R G; McKenzie, J R (2013). Age composition of commercial snapper landings in SNA 2, 2007–08. *New Zealand Fisheries Assessment Report 2013/25*. 32 p.

Boyd, R O; Gowing, L; Reilly, J L (2004) 2000–2001 national marine recreational fishing survey: diary results and harvest estimates. . Final Research Report for Ministry of Fisheries. (Unpublished report held by Fisheries New Zealand, Wellington.) 93 p.

Boyd, R O; Reilly, J L (2002) 1999/2000 National marine recreational fishing survey: harvest estimates. Final Research Report for Ministry of Fisheries Research Project REC9803. (Unpublished report held by Fisheries New Zealand, Wellington.)

Bradford, E (1998) Harvest estimates from the 1996 national marine fishing surveys. New Zealand Fisheries Assessment Research Document 1998/16. 27 p. (Unpublished document held by NIWA library, Wellington.)

Bull, B; Francis, R I C C; Dunn, A; Gilbert, D J; Bian, R; Fu, D (2012) CASAL (C++ algorithmic stock assessment laboratory): CASAL User Manual v2.30.2012/03/21. *NIWA Technical Report 135*. 280 p.

Bull, B; Francis, R I C C; Dunn, A; McKenzie, A; Gilbert, D J; Smith, M H (2004) CASAL (C++ algorithmic stock assessment laboratory): CASAL User Manual v2.06-2004/09/26. *NIWA Technical Report 126.* 261 p.

Francis, M P; Paul, L J (2013) New Zealand inshore finfish and shellfish commercial landings, 1931–82. *New Zealand Fisheries Assessment Report 2013/55.* 136 p.

Francis, R I C C (2011) Data weighting in statistical fisheries stock assessment models *Canadian Journal of Fisheries and Aquatic Sciences*. 68: 1124–1138.

Froese, R; Pauly, D (2000) FishBase 2000: concepts, design and data sources. ICLARM, Los Banos, Laguna, Philippines. 344 p.

Gilbert, D J; Phillips, N L (2003) Assessment of the SNA 2 and Tasman and Golden Bays (SNA 7) snapper fisheries for the 2001–02 fishing year. *New Zealand Fisheries Assessment Report 2003/45*.

Gilbert, D J; Sullivan, K J (1994) Stock assessment of snapper for the 1992–93 fishing year. New Zealand Fisheries Assessment Research Document 1994/3. 37 p. (Unpublished document held by NIWA library, Wellington.)

Gilbert, D J; Taylor, P R (2001) The relationships between snapper (*Pagrus auratus*) year class strength and temperature for SNA 2 and SNA 7. *New Zealand Fisheries Assessment Report 2001/64*. 33 p.

Hartill, B; Sutton, C (2011) Characterisation and catch per unit effort indices for the SNA 7 fishery. *New Zealand Fisheries Assessment Report 2011/53*. 55 p.

Heinemann A; Gray, A. (in prep.) National Panel Survey of Recreational Marine Fishers 2022-23.

King, M R (1985) Fish and shellfish landings by domestic fishermen, 1974–82. *Fisheries Research Division Occasional Publication: Data Series 20*. 96 p.

King, M R (1986) Catch statistics for foreign and domestic commercial fishing in New Zealand waters, January–December, 1983. *Fisheries Research Division Occasional Publication: Data series 21*. 140 p.

King, M R; Jones, D M; Fisher, K A; Sanders, B M (1987) Catch statistics for foreign and domestic commercial fishing in New Zealand waters, January – December 1984. *New Zealand Fisheries Data Report No. 30*. 150 p.

Langley, A D (2010) Stock assessment of SNA 2 for 2010. *New Zealand Fisheries Assessment Report 2010/26.*

Langley, A. (2014). Updated CPUE analyses for selected South Island inshore finfish. *New Zealand Fisheries Assessment Report 2014/40*. 116 p.

Maggs, J.Q.; Armiger, H.; Evans, O.; Taylor, R; Davey, N.; Payne, G.; Miller, A.; Spong, K.; Parkinson, D.; Bian R.; Hartill, B.W. (2024). Trends in recreational boat effort and harvest from 2004–05 to 2022–23. *New Zealand Fisheries Assessment Report 2024*/xx. xx p.

Middleton, D.A.J. (2024). Characterisation and CPUE for the snapper fishery in SNA 2 from 1989 to 2023. *New Zealand Fisheries Assessment Report 2024*/xx. xxx p.

Ministry of Fisheries (2008). Harvest Strategy Standard for New Zealand Fisheries. 25 p. Available online at: https://fs.fish.govt.nz/Doc/16543/harveststrategyfinal.pdf.ashx

Oosting, T (2021) Connecting the past, present and future: A population genomic study of Australasian snapper (*Chrysophrys auratus*) in New Zealand. (Unpublished PhD thesis,Victoria University of Wellington.)

Paul, L J (1976) A study on age, growth and population structure of the snapper, *Chrysophrys auratus* in Hauraki Gulf. *New Zealand Fisheries Research Bulletin No. 13*. 63 p.

Ritchie, L; Saul, P; O'Sullivan, K. (1975) The wetfish report 1941–1970. *New Zealand Ministry of Agriculture and Fisheries Fisheries Technical Report 137*. 370 p.

Schofield, M I; Langley, A D; Bentley, N; Middleton, D A J (2018a) Catch-per unit-effort (CPUE) analyses for SNA 2. *New Zealand Fisheries Assessment Report 2018/15*. 87 p.

Schofield, M I; Langley, A D; Middleton, D A J (2018b) Catch-per unit-effort (CPUE) update for FMA 2 snapper (SNA 2). Report for Fisheries Inshore New Zealand. https://www.inshore.co.nz/fileadmin/Documents/Science/SNA2_rapidCPUEupdate_2018.pdf

Smith, P J; Francis, R I C C; Paul, L J (1978) Genetic variation and population structure in the New Zealand snapper. *New Zealand Journal of Marine and Freshwater Research*, 12: 343–350.

Sullivan, K J (1985) Snapper. *In:* Colman, J A; McKoy, J L; Baird, G G (Comps. and Eds.) (1985) Background papers for the 1985 Total Allowable Catch recommendations, pp. 187–214. (Unpublished report, held in NIWA library, Wellington.)

Sullivan, K J; Hore, A J; Wilkinson, V H (1988) Snapper. *In:* Baird, G G; McKoy, J L Papers from the workshop to review fish stock assessments for the 1987–88 New Zealand fishing year, pp. 251–275. (Unpublished report, held in NIWA library, Wellington.)

Sylvester, T (1995) Initial results of the Northern boat ramp survey. *Seafood New Zealand*, February 1995. pp. 11–13.

Teirney, L D; Kilner, A R; Millar, R B; Bradford, E; Bell, J D (1997) Estimation of recreational harvests from 1991–92 to 1993–94. New Zealand Fisheries Assessment Research Document 1997/15. 43 p. (Unpublished document held by NIWA library, Wellington.)

Walsh, C; McKenzie, J M; Bian, R; Armiger, H; O'Maolagain, C; Buckthought, D; Smith, M; Ferguson, H; Miller A (2012) Snapper catch-at-length and catch-at-age heterogeneity between spatial strata in SNA 2 bottom trawl landings, 2007–08 and 2008–09. *New Zealand Fisheries Assessment Report 2012/40*. 44 p.

Wright, P; McClary, D; Boyd, R O (2004) 2000/2001 National Marine Recreational Fishing Survey: direct questioning of fishers compared with reported diary data. Final Research Report for Ministry of Fisheries Project REC2000-01: Objective 2. (Unpublished report held by Fisheries New Zealand, Wellington.)

Wynne-Jones, J; Gray, A; Heinemann, A; Hill, L; Walton, L (2019). National Panel Survey of Marine Recreational Fishers 2017–2018. *New Zealand Fisheries Assessment Report 2019/24*. 104 p.

Wynne-Jones, J; Gray, A; Hill, L; Heinemann, A (2014) National Panel Survey of Marine Recreational Fishers 2011–12: Harvest Estimates. *New Zealand Fisheries Assessment Report 2014/67.* 139 p.