

5. Status of the Deepwater Stocks to be Fished

5.1 Historic Catch and Effort Trends

An initial description of New Zealand high seas bottom fisheries in the SPRFMO Area was provided by Penney *et al.* (2007). The information below is primarily extracted from that document, with catch and effort data updated to reflect New Zealand flagged vessels only, with catch from foreign flagged vessels landing into New Zealand removed.

5.1.1 Catch and Effort Summaries

- **Bottom Trawl Fishery**

Table 10 shows the total reported trawling effort (number of vessels and number of tows), and catch of the top ten species, and for all species, in all fishing areas over 2002-2006. A total of 40 different New Zealand flagged vessels participated in the fishery over 2002-2006, making 11,145 tows and reporting 12,352t of all species (retained) catch. The average annual effort (vessels and tows) and average annual catches of the top ten species in all areas, are also shown for each year, with an average of 18 vessels conducting an average 2,229 tows per year over the period. Table 11 shows the total trawl effort (number of tows) and catches of the top ten species over the 2002 - 2006 period, split by the fishing areas shown in Figure 9.

Over the reference period, the number of New Zealand flagged vessels participating in this fishery per year declined from 23 in 2002 to 12 in 2006. Together, the top ten species contributed 96% of the reported total catch by New Zealand flagged vessels. Orange roughy contributed 75% of the reported catch by these vessels, and was the declared target species on most trips. The average annual Orange Roughy catch over 2002-2006 was 9,259,377 kg. Other significant contributors to catches, and occasionally listed as target species, were deep sea cardinal fish, oreos (black, smooth and spiky oreo) and alfonsinos (slender and longfinned beryx). Longer-term orange roughy catch trends over 1990 - 2007 are summarised separately by fishing area and year in Table 12, and plotted in Figure 25.

Table 10. Summary of the total annual catch (kg) per year of the top ten species by New Zealand flagged high seas trawling operations in the SPRFMO Area from 2002-2006. (See Table 4 for species codes)

Year	No. Vessels	No. Tows	ORH	BOE	EPT	BYX	SSO	RIB	RAT	BSH	BOA	SOR	All Species
2002	23	2,944	2,578,152	120,845	159,107	16,960	50,088	42,624	61,497	36,863		17,329	3,179,785
2003	19	2,928	1,972,503	62,390	226,286	94,256	25,391	91,775	84,349	55,702	84,754	29,142	2,937,207
2004	17	1,952	1,696,753	89,708	42,396	85,036	91,135	45,917	34,399	7,998		13,592	2,188,152
2005	17	2,186	1,597,109	267,756	188,516	25,557	75,414	62,905	67,297	4,817	30	13,624	2,395,380
2006	12	1,135	1,414,860	57,187	21,245	27,785	5,922	33,238	26,956	15,099		4,477	1,651,776
Average	18	2,229	1,851,875	119,577	127,510	49,919	49,590	55,292	54,900	24,096	16,957	15,633	2,470,460
Total	40	11,145	9,259,377	597,886	637,550	249,594	247,950	276,459	274,498	120,479	84,784	78,164	12,352,300

Table 11. Summary of the total annual catch (kg) by fishing area (Figure 1) of the top ten species by New Zealand flagged high seas trawling operations in the SPRFMO Area from 2002-2006. (See Table 4 for species codes)

Fishing Area	No. Tows	ORH	BOE	EPT	BYX	SSO	RIB	RAT	BSH	BOA	SOR	All Species
Challenger	6,242	3,298,557	6,169	395,025	54,824	880	250,602	272,153	114,178	30	48,754	4,741,510
West Norfolk	1,075	1,560,184	110	30,186	3,726	10	4,165	378	32		241	1,609,341
Lord Howe	1,145	664,612	1,516	212,169	188,256	1,268	18,221	1,161	1,474	30	13,945	1,168,666
Louisville	2,570	3,735,294	589,941	170	2,193	245,792	3,421	651	4,015		15,224	4,639,629
Other	113	730	150		595		50	155	780	84,724		193,154
Total	11,145	9,259,377	597,886	637,550	249,594	247,950	276,459	274,498	120,479	84,784	78,164	12,352,300
% Contribution		75%	5%	5%	2%	2%	2%	2%	1%	1%	1%	100%

Table 12. Reported total catch (tonnes) of orange roughy by New Zealand flagged high seas trawling operations in the SPRFMO Area from 2002-2006, by fishing area, and average annual catch over the period. (The shaded area shows the SPRFMO interim measures reference period.)

Year	No. Vessels	South Tasman	Challenger	West Norfolk	Lord Howe	Louisville Ridge	Other Areas	Total
1990	13		35		126	377	20	559
1991	14		1		52	17	70	141
1992	21		230		484	13	32	758
1993	27		666		1,179	624	97	2,566
1994	41		950		584	625	36	2,195
1995	53		635		19	10,465	77	11,195
1996	55		477		21	7,402	101	8,002
1997	45	405	378		30	3,025	25	3,862
1998	42	463	278		17	1,569	2	2,329
1999	37	1,641	756		21	2,409	121	4,948
2000	29	30	193		17	1,315	19	1,574
2001	14		730	176	108	1,486		2,499
2002	23		1,460	432	96	568	22	2,578
2003	19		868	25	218	859	3	1,973
2004	17		347	106	132	1,106	5	1,697
2005	17		425	327	190	623	33	1,597
2006	12		202	670	29	493	22	1,415
2007	9		36	515	34	280		866
Total		2,539	8,667	2,251	3,356	33,256	685	50,753

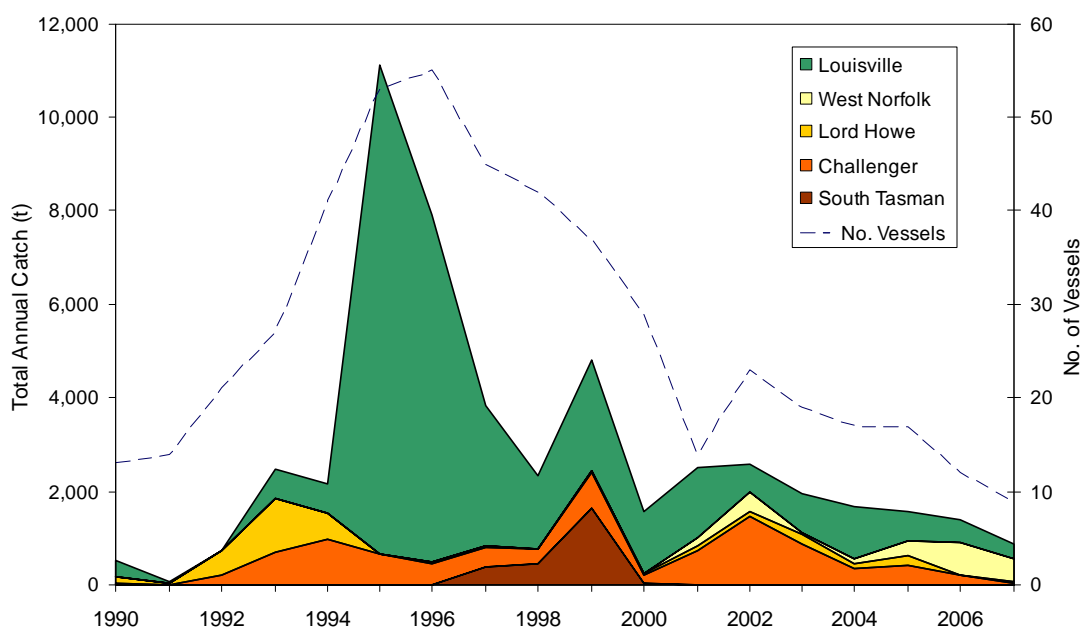


Figure 25. Summary showing trends in total reported annual effort (no. of vessels) and total catch (tonnes) of orange roughy by New Zealand flagged high seas trawling operations in the four main high seas fishing areas over the period 1990 - 2006 (see Table 12 for data).

The most important fishing area for orange roughy over the history of these fisheries has been the Louisville Ridge, producing 66% of the total New Zealand flagged catch since 1990 (Table 12). The next most important area has been the NW Challenger Plateau, contributing 17% of the catch, with the high seas portion of the South Tasman Rise producing 5% of the total catch in a brief fishery over 1997 - 2000.

There have, however, been different catch trends over time in these different fishing areas. The first area to be targeted was, in fact, the Lord Howe Rise, where catches peaked at 1,179 t in 1993, rapidly declined to low levels, and then picked up somewhat over the reference period as a result of increased effort on the southern Rise. At the same time, reasonably good catches were made on the Challenger Plateau, reaching 950 t in 1994, declining to low levels by 2000, and then increasing rapidly to a peak of 1,460 t in 2002. Catches on the Challenger Plateau have since decreased to low levels.

After the decline in the Lord Howe Rise fishery, effort shifted to the Louisville Ridge, where catches increased rapidly to a peak of 10,456 t in 1995. The number of participating vessels also more than doubled over this period (Table 12, Figure 25). Catches on the Louisville Ridge then declined rapidly to <1,000 t by 2002. A brief fishery on the South Tasman Rise reached a peak catch by New Zealand flagged vessels of 1,641 t in 1999, and then collapsed. Most recently, fishing effort has focussed on the West Norfolk Ridge. Fishing only started in that area in 2001, and the area now produces most of the annual orange roughy catch by New Zealand flagged vessels, reaching a recent peak of 670 t in 2006.

• **Bottom Line Fisheries**

In contrast to the bottom trawl fishery, fishing effort by New Zealand flagged bottom line (bottom longline, trot line and dahn line) fisheries increased steadily over the SPRFMO reference period of 2002 - 2006 (Table 13), from zero in 2002 to 10 vessels fishing 501,810 hooks, in 2006. A total of 17 different vessels bottom-lined in the SPRFMO Area over the period, fishing a total of 1.2 million hooks. Effort averaged 6 vessels and 303,298 hooks per year over the period.

Table 13. Reported total annual high seas bottom line fishing effort (no. of vessels and no. of hooks for the bottom longline - BLL, dahn line - DL, trot-line - TL and handline - HL fisheries) by New Zealand flagged vessels over the reference period of 2002 - 2006.

Year	No. Vessels	BLL Hooks	DL Hooks	TL Hooks	HL Hooks	Total Hooks
2002	0					
2003	3	50,538	2,900			53,438
2004	7	229,425	36,984	2,400		268,809
2005	11	362,438	18,895	2,690	8	384,031
2006	10	483,194	18,610		6	501,810
Average	6	281,399	19,347	2,545	7	303,298
Total	17	1,125,595	77,389	5,090	14	1,208,088

The total catch of the 59 species that contributed to bottom line catches was 741.4 t. Of this, 97% of the catch (719.7 t) consisted of the top ten species (Table 14). The primary target species was bluenose, which contributed 67% of the catch, with hapuku / bass being the only other significant target species, contributing 21% of the catch.

Table 14. Reported total annual New Zealand flagged high seas bottom line catch of the top ten species / groups in the SPRFMO Area over the reference period of 2002 - 2006 (see Table 6 for species codes).

Year	BNS	HPB	SPD	KTA	SKI	KIN	PTO	SPE	SCH	RSN	Total
2002											
2003	6,028	7,240	1,200	1,356			745	459	164	10	17,202
2004	116,303	24,224	379	6,166	1,892	880	3,215	197	1,003	230	154,489
2005	101,607	30,978	12,857	10,277	1,876	2,937		603	1,039	614	162,788
2006	271,270	95,231	5,750	5,782	2,321	1,514		1,671	568	1,065	385,172
Total	495,208	157,673	20,186	23,581	6,089	5,331	3,960	2,930	2,774	1,919	719,651
%	66.8%	21.3%	2.7%	3.2%	0.8%	0.7%	0.5%	0.4%	0.4%	0.3%	97%

While bluenose contributed 67% of the bottom line catch over 2002 - 2006, this species was actually reported as the intended target on 80% of the returns for that period, with hapuku / bass being the reported target on 16% of returns. There has been a steady trend in the ratio of targeting between these two species over time, with hapuku / bass targeting decreasing from 34% over 1990-95 to 7% in 2007, while bluenose targeting has increased from 58% over 1990-1995 to 90% in 2007.

There have also been strong fluctuations in fishing effort and catch over the bottom line fishing time series from 1990 - 2007. Effort and catch increased rapidly after 1990, with 6 vessels reporting a catch of bluenose and hapuku / bass of over 300t by 1993 (Table 15 and Figure 26). Despite the number of vessels remaining high to 1998, catches declined to half their 1993 levels, and interest, effort and catch declined rapidly to zero by 2002. Increased market demand and prices for bluenose then prompted a resurgence in this fishery, with effort, bluenose targeting and catch rapidly increasing to their highest levels in 2006.

Table 15. Reported total annual New Zealand flagged high seas bottom effort (No. of vessels and no. of hooks) and catches (tonnes) of the primary target species, bluenose and hapuku / bass, in the SPRFMO Area over the period 1990 - 2007. (Shaded cells show the SPRFMO reference period.)

Year	No. of Vessels	No. of Hooks	Bluenose Catch	Hapuku/Bass Catch
1990	2	27,250	65	530
1991	5	36,400	3,850	3,090
1992	3	21,525	41,035	15,634
1993	6	308,130	214,762	97,579
1994	3	37,649	126,570	59,715
1995	10	94,621	166,787	57,055
1996	7	112,244	90,457	22,807
1997	8	91,292	168,021	26,693
1998	10	214,382	115,211	15,168
1999	4	355,889	52,277	8,250
2000	3	8,580	17,400	9,310
2001	1	36,170	46,235	1,935
2002	0			
2003	3	53,438	6,028	7,240
2004	7	268,809	116,303	24,224
2005	11	384,031	101,607	30,978
2006	10	501,810	271,270	95,231
2007	7	423,420	144,409	31,651

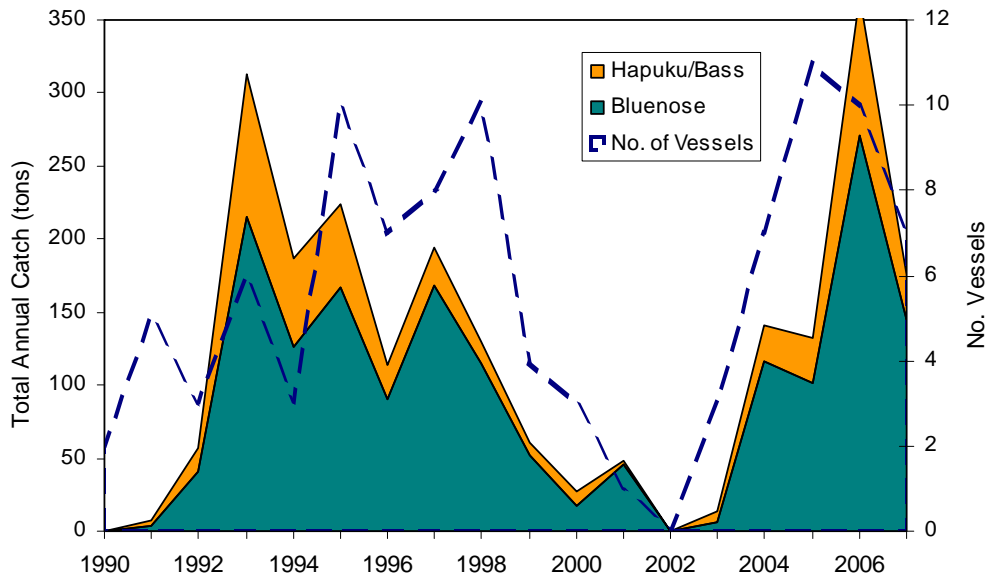


Figure 26. Trends in annual New Zealand flagged bottom line effort (no. of vessels) and catches of bluenose and hapuku / bass in the SPRFMO Area over the period 1990 - 2007.

5.2 Stock Assessments or Fishery Surveys

No formal stock assessments or fisheries independent scientific assessment surveys have been conducted of the deepwater stocks to be fished by New Zealand vessels in the SPRFMO Area. However, New Zealand has annually contracted a review of all available information on catch and effort trends in high seas fisheries for orange roughy, the main target species in the high seas bottom trawl fishery. The most recent review by Clark (2008) presents information on trends in fishing effort, geographic distribution and magnitude of catch and unstandardised CPUE for the Lord Howe Rise, NW Challenger Plateau, West Norfolk Ridge, South Tasman Rise and Louisville Ridge orange roughy fisheries up to the end of the 2005-06 fishing year (Figures 27 - 30).

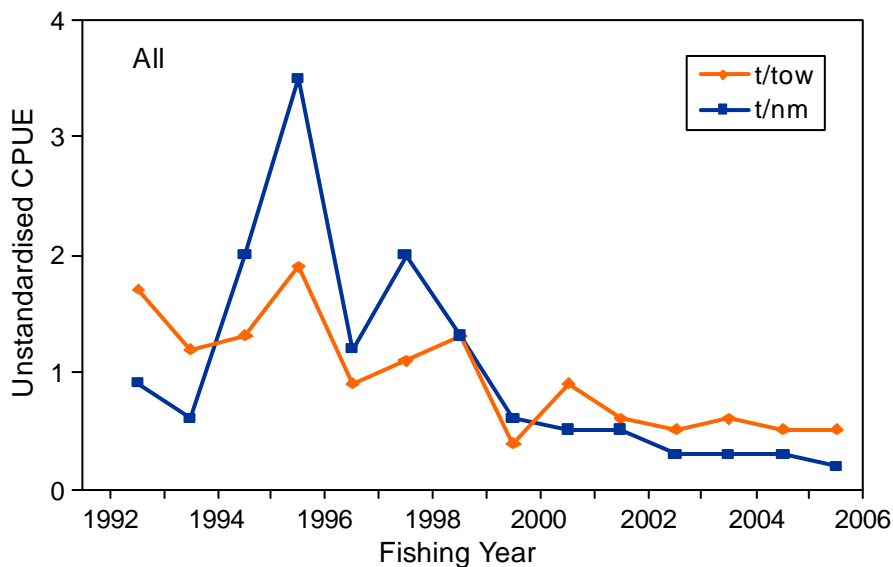


Figure 27. Unstandardised CPUE indices (tonnes per tow or nautical mile) from the Northwest Challenger orange roughy fishery from 1992-93 to 2005-06, for all vessels in all seasons (from Clark 2008).

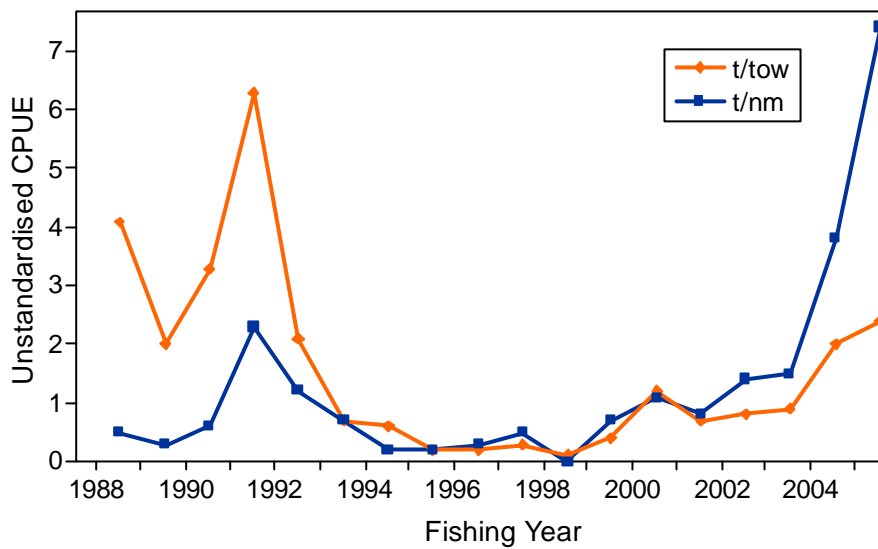


Figure 28. Unstandardised CPUE indices (tonnes per tow or nautical mile) from the Lord Howe Rise orange roughy fishery from 1988-89 to 2005-06 (from Clark 2008).

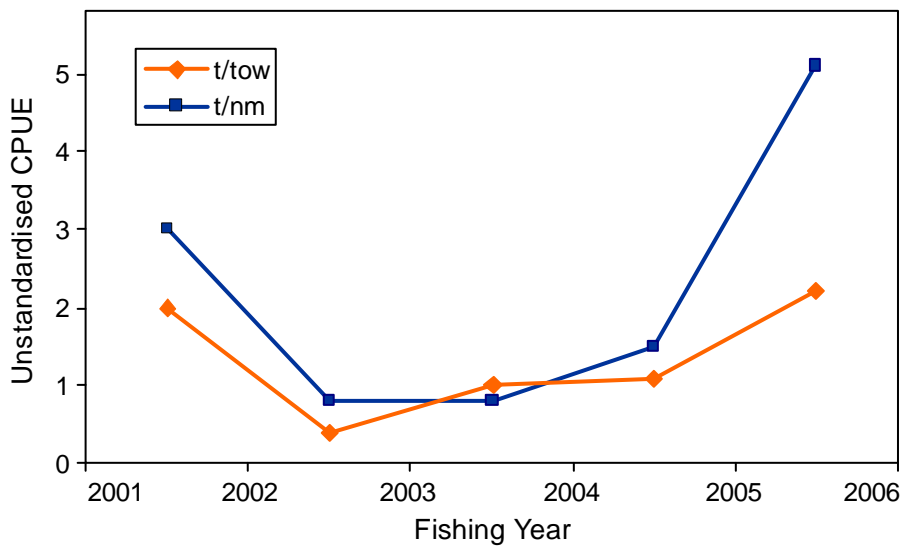


Figure 29. Unstandardised CPUE indices (tonnes per tow or nautical mile) for the Northwest Challenger orange roughy fishery from 2001-02 to 2005-06 (from Clark 2008).

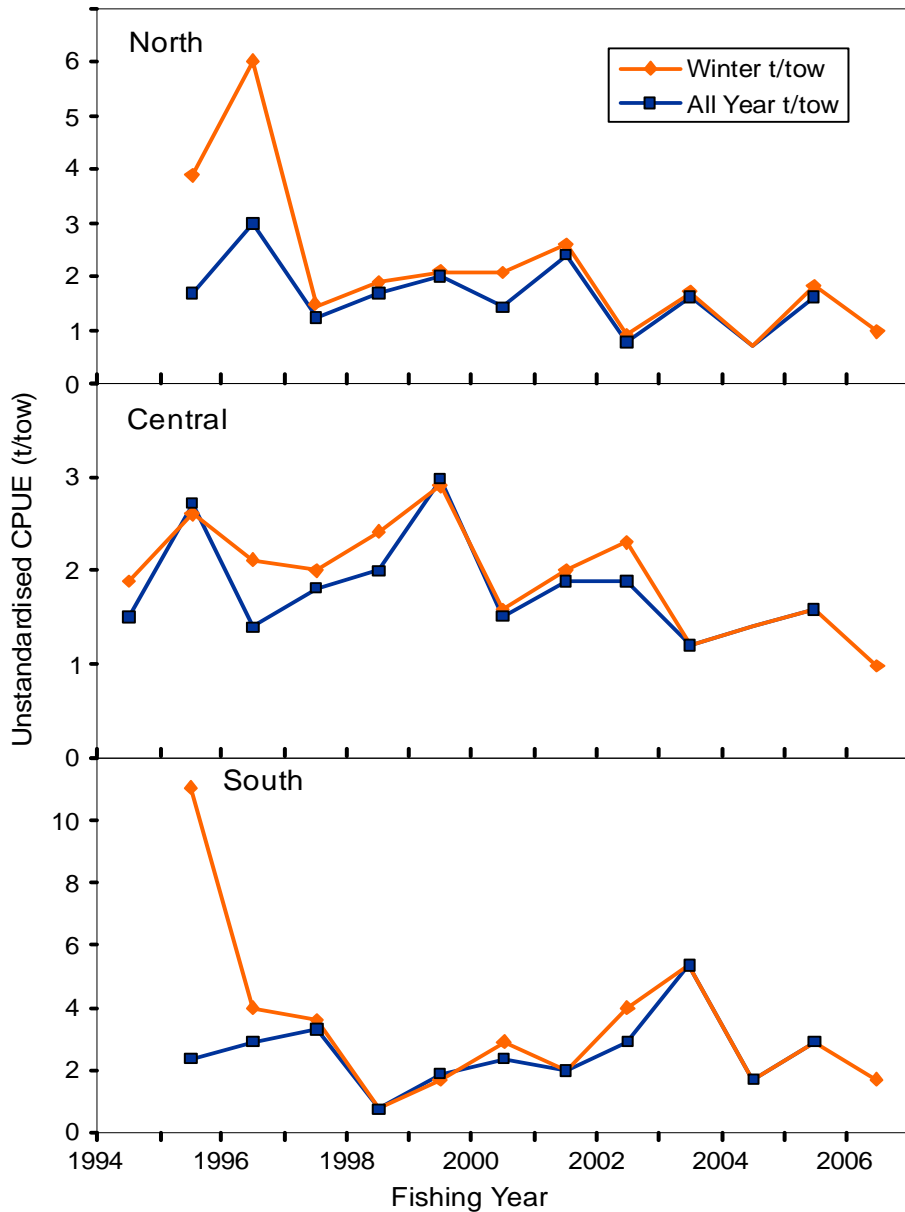


Figure 30. Unstandardised CPUE indices (tonnes per tow or nautical mile) for the Northern, Central and Southern Louisville Ridge roughy fisheries from 1994-95 to 2006-07 (from Clark 2008).

Clark (2008) provides the following overview of trends in these fisheries:

“The total catch by New Zealand vessels had remained relatively consistent up to 2004-05 at between 2000 and 2500 t, but decreased in 2005-06 to about 1700 t. The Northwest Challenger Plateau catch has declined substantially in the last few years, as did the Louisville Ridge in 2005-06 from levels of 1300-1500 t down to 670 t. Catches from the Norfolk Ridge increased substantially in 2004-05 over the preceding two years, and again in 2005-06 to over 700 t. Catch rates on the Lord Howe Rise have shown an increasing trend in the last 3 years. Tow duration has increased consistently in the Northwest Challenger fishery, and, although catch rates overall have remained relatively constant, those in the winter hill fishery have decreased to very low levels. Catch rates on the Louisville Ridge have been variable in recent years, and trends have differed between individual seamounts, with some showing increases, others