

Ngai Tahu Sea Fisheries Report

Appendix 04 Fish Species

4 Fish Species

Appendix 4
FISH SPECIES

Notes:

- This appendix is based on evidence supplied by MAFFish scientists during the Ngai Tahu inquiry. Reference has also been made to L J Paul New Zealand Fishes: An Identification Guide (Reed Metheun, Auckland, 1986) and Tony Ayling and Geoffrey Cox Collins Guide to the Sea Fishes of New Zealand (William Collins Publishers Ltd, Auckland, 1987)
 - Percentages given are those applicable at 1985
 - EPV - estimated primary value (port price)
- 1990/91 statistics are taken from The New Zealand Fishing Industry Board Economic Review 1990

Waitangi Tribunal, Department of Justice, Wellington.

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Appendix 04 Fish Species

4.1 Commercial Inshore Finfish

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JACK MACKEREL/HAUTERE

Trachurus novaezelandiae

Trachurus declivis

Jack mackerel refers to two very similar species, both found in Australasia, averaging 30 to 50 centimetres in length and living for up to 30 years.

They are a schooling, mostly pelagic fish found all around New Zealand out to about 300 metres. The main fishing grounds are off the west coast of the North Island with lesser quantities found around the north of the South Island. They feed on crustaceans and small fish, including other jack mackerel.

Commercial fishing for jack mackerel only developed in the late 1970s after catches of more preferred species such as trevally declined.

The TACC for 1990/91 was just over 32,000 tonnes with an EPV of \$7.14 million.

There is little information on stock size and sustainable yields but it is thought that jack mackerel are an under-used resource.

Percentage of national catch from Ngai Tahu region: 9.5%

KAHAWAI

Arripis trutta

Also a pelagic schooling species, kahawai average 40 to 60 centimetres in length, are slow growers and live for over 20 years. They are common throughout coastal waters, usually at less than 50 metres, but are most abundant in the north of the South Island and north of Cook Strait. Within the Ngai Tahu claim area the major catch is taken off the Cloudy Bay/Kaikoura area. They are streamlined, fast swimming fish which feed on smaller fishes and crustaceans.

Over the summer months huge schools of adult kahawai move into shallow coastal waters and may enter estuarine lagoons and river mouths at high tide. Recreational fisheries flourish at many river mouths as a result of this seasonal movement and within the Ngai Tahu claim area the major east coast rivers at least as far south as the Clutha support important recreational fisheries.

Commercial catches of kahawai were insignificant before the mid 1970s but more substantial fisheries have developed since 1977. Most commercial fishing is done by purse seining: dense schools of kahawai, commonly between ten and 40 tonnes, are spotted, sometimes from planes, and then surrounded by a large net. The bottom of the net is closed ("pursed") to trap the school and the fish are scooped up by hand nets into the fishing vessel.

Kahawai are not subject to the QMS and no TACs apply to this fishery. In 1990/91 the national catch was a little under 8500 tonnes with an EPV of \$2.77 million

NB kahawai is a prohibited species under s65 of the Fisheries Act.

Percentage of national catch from Ngai Tahu region: 14%

PATIKI/FLATFISH

Yellowbelly flounder *Rhombosolea leporina*

Sand flounder *Rhombosolea plebeia*

Black flounder *Rhombosolea retiaria*

Greenback flounder *Rhombosolea tapirina*

New Zealand sole *Peltorhamphus novaeseelandiae*

Lemon sole *Pelotretis flavilatus*

Turbot *Colistium nudipinnis*

Brill *Colistium guntheri*

There are eight commercially fished flatfish species in New Zealand: the yellowbelly, sand, black and greenback flounders; New Zealand sole; lemon sole; brill; and turbot. They are all shallow water inshore fish, fast-growing, short-lived and bottom-feeding. They are generally found in coastal waters at less than 50 metres though some species, such as the soles, occur to moderate depths (100 metres) on the continental shelf. They spawn in the sea during winter and spring months and juveniles gather for up to two years in sheltered inshore waters before moving offshore to spawn. They mainly feed on bottom-dwelling species such as crustaceans and worms.

Important fishing areas in Ngai Tahu waters are the coastlines or Arahura, Pegasus Bay and Canterbury Bight, Otago, and Murihiku.

Flatfish are an ITQ species with a 1990/91 TACC of 6625 tonnes. The South Island inshore trawl fishery depends to a very great extent on flatfish species and approximately 70 percent of the flatfish TACC is caught in the South Island. Because of major annual fluctuations in the size of flatfish stock, TACCs are set at a high level to enable fishers to take advantage of large harvests in good years. For several years the national catch has been well below the TACC, with only a little under 3500 tonnes taken in 1990. The EPV for flatfish in 1990/91 was \$9.12 million.

YELLOW-EYED MULLET/AUA

Aldrichetta forsteri

The yellow-eyed mullet is common in inshore waters all around New Zealand, often in estuarine waters, harbours and bays. It is a schooling fish, averaging 20 to 30 centimetres in length, relatively fast growing and short lived.

These fish are most abundant around the South Island and Banks Peninsula, Waihora and Otago being the most important areas for this species within Ngai Tahu territory. The size of the resource stock is unknown but is thought to be small. They are not subject to the QMS and there is no TAC. There are small commercial fisheries in a number of areas but they are probably best known as the "herring" caught by wharf fishers.

Yellow-eyed mullet are an important element in the marine food chain, being a major food item for many marine fish and fish-eating birds. Because of their role in the complex estuarine food web, MAFFish is reluctant to allow any substantial exploitation of the species even though the present catch is below long term sustainable levels. The species is regulated under the Fisheries Act 1983, with restrictions imposed in the form of permits to fish and minimum net size. Since September 1988 yellow-eyed mullet on the east and south coasts of the South Island have been a prohibited species under s65 of the Fisheries Act 1983. No new permits can be issued in these areas until Ngai Tahu fishing rights have been defined.

Percentage of national catch from the Ngai Tahu region: 1%

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4.2 Shark Fisheries

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The main South Island shark fisheries, using a very wide definition of "non bony" fishes, consist of four species: school shark, rig, elephant fish and spiny dogfish.

ELEPHANT FISH/MAKOREPE

Callorhinchus milii

Apparently restricted to New Zealand, elephant fish are most common along the south and east coasts of the South Island and are particularly plentiful off the Canterbury coast. They range across the continental shelf, from shallow water during the breeding season in spring and summer down to about 200 metres. Unlike most of the true sharks, elephant fish appear to be relatively fast growing and short lived but their reproductive rate is thought to be slow. Named for their distinctive trunk-like snout, they average 60 to 90 centimetres in length.

Like school sharks, elephant fish were first commercially fished in the 1940s for the liver oil industry but since then they have been fished at an increasing rate for the fish and chip trade. Virtually all elephant fish are caught by inshore trawling and are an important part of the coastal Canterbury fishery.

They are a quota species, with TACC levels set low in response to an apparent decline in stock levels. The TACC for 1990/91 was about 600 tonnes.

Percentage of national catch from Ngai Tahu region: 86%

RIG/PIOKE

Mustelus lenticulatus

Another common shark, usually about one metre long, rig is found on the continental shelf all around New Zealand in shallow coastal waters down to a depth of about 200 metres. During spring and summer months adult rig can be found in large numbers in wide shallow bays while in the autumn they migrate towards the outer shelf. In the Ngai Tahu area important rig fisheries are located off Kaikoura and in the South Canterbury Bight.

Rig have been one of the more valuable commercial species, once taken mainly by trawl but now heavily target-fished using long setnets. During the 1970s there was a rapid rise in the size of the catch, with increasing sales of rig under the guise of "lemon fish", and with the introduction of the QMS rig was included as a quota species. The TACC for 1990/91 was about 1730 tonnes with the actual catch reported at just under 1700. The EPV of the catch for 1990/91 was nearly \$3 million.

Percentage of national catch from Ngai Tahu region: 42%

SCHOOL SHARK/TUPERE

Galeorhinus australis

School sharks occur almost world-wide in temperate waters and are probably one of the most common sharks around New Zealand, particularly in the north. They are found across the whole continental shelf from shallow harbour waters to at least 200

metres. They are a medium sized shark, averaging slightly less than two metres, and are slow growing, thought to live to up to 50 years. As they mature late and bear relatively few offspring the rate of reproduction is low.

School sharks are caught mainly by set net and line, but with quite a significant amount (about 15 percent) taken as by-catch by large trawlers working on the outer shelf. There are moderate landings of school sharks all around the South Island with no particular areas of concentration.

In the early 1940s a quite substantial fishery developed based on the production of vitamin A from shark liver oil, but the advent of synthetic vitamin A in the 1950s led to its demise. An export market for fillets to Australia developed in the late 1950s which was temporarily depressed by the discovery of high quantities of mercury in shark flesh.

From 1979 to 1984 catches rose quite significantly and in the absence of information on stock size and reproduction rates there was concern that the fishery might easily be over fished. With the introduction of the QMS it was decided to include school shark (along with rig) as a quota species. The TACC for 1991 was 3027 tonnes with an actual reported catch of nearly 2800 tonnes. The EPV of the 1991 catch was \$4.61 million.

Percentage of national catch from Ngai Tahu region: 42%

SPINY DOGFISH

Squalus acanthias

Spiny dogfish are a schooling migratory species, averaging about one metre in length. They are commonly found off the east and south coasts of the South Island from shallow coastal waters to about 300 metres, but can be found as far down as 700 metres. Like other sharks they are probably slow growing with few off-spring which makes them susceptible to over-fishing despite regional or seasonal abundance.

Dogfish are not subject to quota and catch size has been increasing in recent years despite their reputation for being little more than a nuisance to commercial fishers. More than 6200 tonnes were landed in the 1991 season with an EPV of nearly \$2.5 million.

Percentage of national catch from Ngai Tahu region: 95%

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4.3 Shoreline Shallow Water Shellfisheries

4.3 Shoreline Shallow Water Shellfisheries

Included in these fisheries are tuatua, pipi, cockle, toheroa and kina.

CLAMS

Tuatua, pipi and cockle are found throughout the South Island and are the most common shallow water shellfish. In some areas they are found in very large numbers and they represent an important food resource for fish, birds and people.

There are two New Zealand species of tuatua, one restricted to the North Island and the other found around the South Island and lower North Island. Tuatua prefer fine sand habitats, avoiding mudflats; they burrow fairly shallowly and generally live at lower tide levels. They can change location, usually at night, by emerging from the sand and moving with the current.

Pipi occur throughout New Zealand, usually at or below midtide on beaches inside harbour entrances. Pipi beds are vulnerable to changes in current patterns and, often being near freshwater inflows, are prone to pollution.

Cockles occur on mud and sand flats at midtide level and prefer the shelter of harbours, estuaries and confined bays. They often form dense beds and are one of the most abundant bivalves found throughout New Zealand.

The toheroa is much scarcer, being found in significant quantities only in the fine sands of the exposed beaches at Oreti and Te Wae Wae in Foveaux Strait. They are large, active burrowers and can be found 20 centimetres below the surface. They are unique to New Zealand and have acquired an international gourmet reputation, much sought after in their extremely limited open seasons. A small commercial fishery began in 1904 but ceased in the 1970s as toheroa populations declined. Today the species is fished on a recreational basis, with brief, carefully controlled open seasons.

Kina often occur in dense clumps in rocky coastal areas throughout New Zealand. They are found in intertidal pools out to about 50 metres depth, normally close to weed concentrations. Their average diameter, without spines, is 8 to 12 centimetres and they can reproduce rapidly in favourable habitats.

Fishing for these species is largely non-commercial although there are a few small-scale cockle and seaweed harvesting enterprises around the South Island coastline.

There is also a commercial kina fishery in the South Island which landed about 150 tonnes in the 1987/88 fishing year. All the species are managed under non-ITQ policies which provide varying degrees of resource protection depending on the extent to which the stocks are commercially exploited or otherwise under threat.

BLUE COD/RAWARU

Parapercis colias

Not a cod at all but a member of the sandperch family, the blue cod is found only in New Zealand. It is a round-bodied fish averaging 30 to 40 centimetres, moderately fast growing and living for up to 10 to 15 years. A bottom dwelling species, it occurs in rocky habitats from shallow water down to 150 metres depth. Blue cod are common throughout New Zealand but are larger and more abundant around the South Island and the Chatham Islands. Around some southern reef habitats they may be one of the commonest species. They are voracious eaters: stomach content analysis suggests they feed on almost any edible organism including weed.

Blue cod are one of New Zealand's most popular coastal species, and are the basis of important commercial and recreational fisheries in several areas. Fisheries have flourished, declined and recovered again since the end of the last century, the most recent increase being in the 1980s when cod pots were introduced to replace the traditional handline method. Blue cod fisheries are fished almost entirely by the inshore domestic fleet with major fisheries in the Ngai Tahu area lying off Murihiku and Rakiura as well as a smaller one off Otakou.

Other than minimum size regulations there were few controls on blue cod fishing until the introduction of the QMS. In 1986 it became a quota species so as to prevent the transfer of effort into the blue cod fishery from other quota fisheries. The species was not thought to be overfished but expansion of the fishery, particularly in Murihiku, has not proved sustainable long term.

For the 1990/91 season the TACC was set at 2678 tonnes although only 1591 tonnes was actually caught. The EPV of the catch for that season was \$2.53 million.

Percentage of national catch from the Ngai Tahu region: 67% with a further 30% from off the Chatham Islands.

Waitangi Tribunal, Department of Justice, Wellington.

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Appendix 04 Fish Species

4.4 Others

4.4 Others

BARRACOUTA/NIHOMAKAA, HAKA, MAKA

Thyristes atun

The barracouta, a member of the snake mackerel family, is a slender semi-pelagic fish averaging 60 to 90 centimetres in length. It is relatively fast growing and short lived with most adults being three to ten years old. Barracouta gather in spawning concentrations from late winter through to autumn; known spawning grounds are in Pegasus Bay, off the Canterbury and Westland coasts and around the Chatham Islands, as well as in areas off the North Island. They are a very mobile species, capable of swimming up to 500 nautical miles, but little is presently known of their migratory movements. They feed on zoo plankton and small fish.

Barracouta are a schooling fish which can be found either on the sea bottom or in mid water or at the surface. Though virtually the whole barracouta catch is taken by bottom trawlers it can also be taken by trolling at or just below the surface. Barracouta occur in temperate waters on the continental shelf over a wide depth range, from close inshore out to 400 metres. Though widespread throughout New Zealand waters it is most abundant south of Cook Strait.

Commercial landings of barracouta have been recorded since 1936 but the domestic fleet traditionally regarded barracouta as a less preferred species, caught by accident and with only a limited market, mainly for pet food and fish meal. Large quantities began to be taken after 1967 when foreign trawlers, mostly Japanese, began fishing in New Zealand waters. Reported catches by foreign fishers peaked at about 47,000 tonnes in 1977. After the introduction of the EEZ in 1978 the national catch dropped dramatically, to less than 15,000 tonnes, with the greater share caught by domestic inshore and New Zealand chartered trawlers. A TACC limit was imposed in 1983 and the total catch for 1990/91 was 22,986 tonnes with an estimated value of \$8.27 million. Barracouta is now an important fishery nationally and especially so for the South Island.

Since 1973 it has been ranked in the top five fin fish species caught by the inshore domestic fleet since 1973.

Percentage of national catch from the Ngai Tahu region: 83%

BLUENOSE/MATIRI

Hyperoglyphe antarctica

A member of the warehou family, bluenose is also known in New Zealand as blue-nose groper, bonita, bream and Griffin's silver fish. It is very similar to hapuku and bass, although quite unrelated, and hence is often identified as blue-nose groper.

The age and growth patterns of bluenose are unknown but it appears to be moderately fast growing. It is a large heavy-bodied fish reaching an average length of 60 to 100 centimetres. It appears to be quite migratory and feeds on pelagic organisms such as

planktonic jellyfish.

Bluenose are widely distributed around New Zealand and along the Chatham Rise. Their habitat is generally over rough seabed on the central to outer shelf and upper continental slope.

Bluenose has been caught commercially since the 1930s but significant catches were not recorded until the 1980s. Mid water trawling for bluenose and alfonso off the south east coast of the North Island brought a major increase in New Zealand landings. The South Island fishery is fairly small, with the catch in the Ngai Tahu region likely to be a by-catch of the hapuku line fishery.

The national catch of bluenose in 1990/91 was 1425.5 tonnes and the TACC was 1769 tonnes. The EPV was \$3.14 million.

Percentage of national catch from the Ngai Tahu region: 11%

BLUE WAREHOU

Serioloba bama

Blue warehou, also known simply as warehou or common warehou, is a midwater fish also found off south Australia. It is closely related to the silver warehou, white warehou and bluenose, all of which are fished commercially.

It is a moderately fast growing fish, reaching an average length of 40 to 60 centimetres, and living for at least 15 years. It spawns in the winter and spring months in many mid shelf grounds and feeds mostly on plankton. It is a migratory fish with considerable variation in its seasonal appearance in different areas.

Blue warehou is a shallow water to mid shelf species and can be found in large surface-swimming schools both in open water and in harbours and bays. It is seldom found north of the Hauraki Gulf and is most common around Cook Strait and much of the South Island. Most of the catch is taken by trawlers off the east and west coasts of the South Island and off Stewart Island.

The fishery is not particularly large and for many years blue warehou was not highly regarded. Interest in this species grew after the introduction of the deepwater policy in 1983 and the availability of more popular species declined. Catches of blue warehou peaked in 1983/84 when nearly 5000 tonnes were caught but since then the catch has fallen. The total catch for 1990/91 was 1483.3 tonnes with an EPV of \$1.57 million.

Percentage of catch from the Ngai Tahu region: 75%

DREDGE OYSTER/TIO

Tiostra lutaria

Also known as the Bluff, Foveaux Strait or Stewart Island oyster. Shell length averages 6 to 8 centimetres but can reach 10 centimetres. It is relatively short lived with most adults being four to eight years old.

As its alternative names indicate, the dredge oyster is most abundant in Foveaux Strait but is widely distributed around New Zealand, usually in small beds on sandy mud around harbours and bays. The only beds large enough to support commercial fisheries are found in Foveaux Strait where the oysters form dense beds on gravelly or sandy bottoms, from 25 to 50 metres. There are also small fisheries in Tasman and Golden Bays.

Bluff oysters have been fished commercially since the 1860s, and from the 1880s until deregulation in the early 1960s vessel restrictions were imposed. They are now strictly controlled by a limited season (March to August), limited fleet, seasonal vessel and total quotas and size limits.

GEMFISH/MAKATAHARAKI

Rexea solandri

Another member of the snake mackerel family, the gemfish is similar to the barracouta in shape, though thicker and deeper-bodied. Like the barracouta, the gemfish has a menacing array of teeth. Its average size is 60 to 90 centimetres, and it lives to about 12 to 16 years.

Gemfish are widespread around New Zealand on the continental shelf and slope in depths ranging from 150 to 500 metres. They are most common in South Island waters, especially south-east of Stewart Island. They are voracious carnivores, feeding mainly on fishes and squids in mid or near bottom waters. They appear to migrate northward to spawning grounds in the autumn to early spring.

The commercial fishery for gemfish was traditionally quite small, no more than a few hundred tonnes, but with the advent of larger fishing vessels the catch size rose, by the mid 1980s, to more than 8000 tonnes. Only a quarter of the catch was then taken by domestic fishers, the balance being caught by joint venture and foreign licensed vessels. In 1990/91 the TACC for gemfish was 7223 tonnes: 4170.2 tonnes were caught with an EPV of \$44.17 million. There is now no fishing for gemfish by foreign licensed vessels and about two thirds of the catch is caught by domestic fishers. Percentage of national catch from the Ngai Tahu region: 88%

HAKE/KEHE

Merluccius australis

The New Zealand hake is a large cod-like fish averaging 70 to 100 centimetres long and living to at least 25 years of age.

During winter hake gather in large numbers to spawn, mainly off the west coast of the South Island south of Hokitika at 600 to 800 metres depth. The spawning groups disperse during summer months and apparently move up into mid water. Adult hake prey on medium sized fish and squid.

Hake are most prolific off the South Island's west coast between 500 to 700 metres and the fishery there is by far the most important for the species. They are also found on the Chatham Rise and Campbell Plateau at depths of 200 to 800 metres.

Hake was little known in New Zealand until the mid 1970s when a fishery began to develop mainly off the west coast of the South Island. In 1977 20,000 tonnes were caught by Japanese and Korean trawlers, but since the declaration of the EEZ in 1978 foreign catches have been small and the size of the catch has dropped dramatically. Catches have not exceeded 6000 tonnes since 1977 and most of it is now caught by large factory trawlers under charter to New Zealand companies.

Though it appears that the New Zealand stock is not a very productive one, hake is a very high value fishery. In 1990/91 the fishery had an EPV of \$9.11 million with a total of 9113.6 tonnes caught.

Percentage of national catch from the Ngai Tahu region: 97%

HAPUKU/HAPUKA/GROPER

Polyprion oxygeneios

There are two species commonly known as New Zealand groper (or grouper): hapuku and bass, the latter also known as bass groper. Its general appearance is similar though the hapuku is slimmer.

The hapuku is a huge solid fish, reaching maturity at about 60 centimetres, but it can grow to over 1.8 metres and can weigh at least 100 kilograms. Age and growth rates have been difficult to determine but it seems likely that it is a slow growing fish and

long lived (50+ years). This is consistent with the fact that the hapuku stock can be easily fished out and not recover for many years if at all. Hapuku move in herds, from between a handful to over 100 and they migrate on a seasonal basis. Northern herds move into deeper water during summer months, while in colder southern waters hapuku spend the summer in shallow coastal waters and head for deeper water in winter. They feed probably on any moving animal they can capture.

Hapuku are distributed widely around New Zealand and occupy a wide depth and habitat range, from shallow reefs and pinnacles to the open seabed at 400 metres or even deeper. Bass have an overlapping but generally deeper range.

The hapuku fishery is nationwide with the largest catches coming from Northland, East Cape, Hawkes Bay and Cook Strait/Canterbury. Hapuku have been an important commercial species in the inshore fishery for many decades with catches of between 1000 and 2000 tonnes recorded since at least 1930. From the mid 1970s there was a significant rise in catch size (to about 2300 tonnes between 1980 and 1984) and TACC limits were imposed. There remains a strong probability that the stock is being overfished. In 1990/91 the national catch was 1062.5 tonnes with a TACC of 9056 tonnes. The EPV for 1990/91 was \$3 million.

Percentage of national catch from the Ngai Tahu region: 39%

HOKI

Macruronus novaezelandiae

New Zealand hoki is a deep water species from the hake family and also occurs off southern Australia.

It is an elongated fish with a long tapering body and tail, growing to an average size of 60 to 100 centimetres. Hoki grow quite rapidly and their maximum age is about 20 to 25 years. They feed in mid water on crustaceans, small fish and squid. At mid winter they migrate to spawn in deep water, the main spawning ground being the Hokitika Canyon off the west coast of the South Island. Hoki are highly fecund serial spawners, releasing over a million eggs in multiple batches in a season. Hoki can be found all around New Zealand but they are most abundant off the west coast of the South Island, where 90% of the catch is taken, and on the Chatham Rise and Campbell Plateau. They are a predominantly deep water species living at or near the sea bottom most of the time. They commonly occur beyond the shelf edge in 200 to 600 metres depth, but can also be found in shallow coastal bays and out to 900 metres. Until the 1970s hoki had virtually no commercial value: hoki catches were considered worthless and were usually dumped. It is now New Zealand's single most valuable species. In the late 1970s it became a target species for large offshore trawlers, with the Japanese taking more than 50,000 tonnes from the South Island's west coast in 1977. Before the introduction of the EEZ the Soviet and Korean fleets were also fishing extensively for hoki. The fishery developed quickly, with New Zealand owned or joint venture vessels becoming major participants. In 1987 the TACC was raised to 250,000 tonnes but has since been lowered. In 1990/91 the national catch was 213,684 tonnes with an EPV of \$111.12 million.

Percentage of national catch from Ngai Tahu region: 96%

LING/HOKARARI

Genypterus blacodes

The New Zealand ling is a large eel-like fish, not related to the northern hemisphere ling, and notable for being "one of the most repulsive of the fishes found in New Zealand" {FNREF|0-86472-103-X|APP4.4|1} It can grow to more than two metres but

the average length is 80 to 120 centimetres. The growth rate appears to be slow and it can live to at least 25 years. It is a vigorous predator, feeding off other quite large fish, such as hoki and southern blue whiting, as well as large invertebrates such as scampi. It spawns from August to October over a number of spawning areas.

Ling are found all around New Zealand but are more abundant in the south and over the Campbell Plateau. They occur in coastal waters, probably preferring deep reefs or canyons, and out to at least 700 metres over open seabed. They are most common between 300 to 500 metres.

Ling is an important commercial species with most of the catch coming from around the South Island, Stewart Island and near the Auckland Islands. Japanese and Korean longliners took large amounts of ling (over 30,000 tonnes in the late 1970s) but the foreign catch declined sharply after the EEZ was declared, and the TACC for 1990/91 was 19,710 tonnes. Most of the catch is now taken by New Zealand chartered trawlers and the actual catch for the year 1990/91 was nearly 10,600 tonnes with an EPV of \$14.81 million.

Percentage of national catch from the Ngai Tahu region: 92%

ORANGE ROUGHY/NIHOROTA

Hoplostethus atlanticus

New Zealand has at least four species of roughy but the modern multimillion dollar roughy fishery is based on only one, the deep water orange roughy.

Orange roughy is a deep bodied fish with a typically large roughy head, reaching an average size of 30 to 40 centimetres. Little is known of their growth rate but it is thought to be exceptionally slow with fish reaching maturity at about 18 to 20 years. They spawn in dense concentrations once a year in the winter months of June to August. Spawning schools appear to come out of the depths below 1000 metres and after spawning they disperse, perhaps to deep canyons and pinnacles. They feed on fishes, crustaceans and squid.

Orange roughy are rich in oil which has many commercial uses and is similar to the oil produced by sperm whales and jojoba.

Orange roughy is widespread in most temperate seas from the north Atlantic to Australasia and South Africa. It is found in slope waters between 700 and 1500 metres. Its lower depth limit is not yet known and it is the world's deepest fishery.

Commercial fishing for orange roughy only occurs around New Zealand and Australia. It can be caught right around the EEZ within its depth range but the fisheries are based on specific areas of concentration - on the Chatham rise, along the east coast from Gisborne to Kaikoura and on parts of the Challenger Plateau. These fisheries are usually centred on or near irregularities in the seabed such as hills, pinnacles, dropoffs and canyons.

Orange roughy were first identified in the Azores in 1889 but New Zealand specimens were not discovered until the early 1970s. Commercial fishing began in 1979 on the Chatham Rise and then spread to other grounds. The annual catch in 1979/80 was 11,500 tonnes which increased to 50,380 tonnes in 1986/87. In 1990/91 the total catch was 47,612.4 tonnes with an EPV of \$95.22 million.

Percentage of national catch from the Ngai Tahu region: 79%

OREOS

Alloctytus niger

Pseudocuttus maculatus

Oreo dories, of which there are five recorded species around New Zealand, are

deepwater relatives of the true dorids. The New Zealand fishery is based on the black oreo, so far known only in New Zealand, and the smooth oreo.

Black oreos grow to an average size of 30 to 40 centimetres, smooth oreos a few centimetres longer. Little is presently known about their life cycles but they are thought to be slow growing with fairly low rates of reproduction. The two species appear to school together, or move in close proximity, near canyons and pinnacles and are often caught together. Oreos swim by holding their bodies rigid and undulating their fins - a method that requires very little outlay of energy. It is thought that oreos may be quite sedentary fish with no apparent migratory patterns and may therefore be susceptible to local exploitation. Both species are found between 600 to 1200 metres depth, most abundantly along the south Chatham Rise, and they form the most important fishery in that area. They also occur on the east coast of the South Island and the Campbell Plateau. Black oreos appear to prefer more southern grounds, rarely found north of Cook Strait, while smooth oreos can be found at least as far north as Hawkes Bay.

Deepwater trawling for the oreos was begun by Soviet fishers in the 1970s but they were excluded from this lucrative fishery in 1979. The foreign licensed catch is now non-existent while the domestic fleet lands most of the oreo catch using large deepwater vessels. Combined management strategies for both species were introduced in 1983 when TACs were applied. In 1990/91 the national catch was just over 14,500 tonnes with an EPV of \$10.01 million.

Percentage of national catch from Ngai Tahu region: 99%

PAUA

Haliotis iris

Three species of paua exist in New Zealand but only the black footed or common paua is commercially fished.

Paua are slow growing. The shell begins to form a few hours after larvae hatch from the fertilised eggs but it takes seven to ten years for paua to reach the legal minimum size. In some areas they do not reach legal size.

They are found on rocky coasts from low tide mark to about eight metres depth with the main concentrations in Ngai Tahu territory being along the exposed coastlines of Kaikoura, Otakou, Murihiku, and Rakiura. Other significant beds lie off the Wairarapa, the Marlborough Sounds and Chatham Islands.

Paua fishing had long been important to Maori both as a food resource and for the shell, whereas until the 1970s European fishers were mainly interested in the shell. A small, stable commercial fishery operated until the late 1960s when a bleaching process for paua meat was introduced and an export market rapidly developed.

Demand rose dramatically and the fishery boomed.

An open access policy operated until 1982 and with the growth in demand the number of divers in the industry increased substantially. Over-fishing resulted and fishing stocks declined: a brief moratorium was imposed in 1982 but the quantity of paua taken reached an all time high in 1984 at about 1500 tonnes.

From 1985, following the peak harvest in 1984, the paua fishery has been managed under individual quotas. After the introduction of quotas the TACCs were adjusted both up and down as MAF endeavoured to establish an appropriate limit: in some regions fishers have been concerned that increases were unsustainable while in the other regions higher catch levels were sought. The TACC for 1990/91 was 1228 tonnes with an EPV of \$16.76 million.

After rock lobster, paua is the most valuable coastal fish resource off the South Island. About 65 percent of the TAC is harvested from the South Island's coasts.

RED COD/HOKA

Pseudophycis bachus

Morid cods, a family closely related to true cods of the northern hemisphere, include 15 New Zealand species of which the red cod is the most common.

It is a large, heavy bodied fish, averaging 40 to 60 centimetres in length, with a fairly rapid growth rate. It is generally a schooling fish with seasonal though irregular migrations from the outer continental shelf and upper slope to shallower coastal waters. It eats a wide variety of animals and spawns between July and October, peaking in August. Major spawning grounds have not yet been identified.

The red cod is found around most of New Zealand but is much more common off the South Island, particularly off the east coast. It has a wide depth range, from shoreline to 700 metres, but is most common between 100 and 300 metres. In shallow inshore waters the red cod prefers rocky reef areas, emerging from caves and crevices for night feeding. It is caught mainly by bottom trawling.

There are major fisheries off the Canterbury Bight, Pegasus Bay, northern Westland and Buller. The TACC for 1990/91 was 15,783 tonnes with an actual catch of 6422 tonnes. The EPV for this catch was \$4.69 million. Percentage of national catch from the Ngai Tahu region: 85%

RED GURNARD/PUWHIAIU

Chelidonichthys kumu

There are five species of gurnard in New Zealand waters, the most common being red gurnard. They average 30 to 50 centimetres in length, with a body colour of reddish-pink or brown which blends well with the open sandy bottom that is their normal habitat. They grow rapidly in the first two to four years of life, grow more slowly as adults and seldom live beyond ten years. They have unusual lower pectoral fin rays which act as food sensors, probing the sea bottom in front of them for edible crustaceans. They spawn over the spring and summer months in grounds that appear to be widespread over the inner and central shelf.

Red gurnard are common right around New Zealand except for the Fiordland coast.

They are most abundant in shallow water but can occur as deep as 180 metres.

They have been fished commercially since the 1930s, when only a few tonnes were taken, and since the 1960s the catch has fluctuated between 2000 and 4000 tonnes.

Although a valuable commercial species, red gurnard is to a large extent a bycatch species of other, particularly trawl, fisheries. The TACC for 1990/91 was 4747 tonnes but the recorded national catch was only 2527 tonnes, with an EPV of \$3.03 million.

Percentage of national catch from the Ngai Tahu region: 15%

RED ROCK LOBSTER/KOURA

Jasus edwardii

There are three New Zealand species of rock lobster, or crayfish, but the most important of the three, the red rock lobster, makes up about 95 percent of commercial landings.

The red rock lobster has a spiny head and body, coloured dark red and orange above and paler below. It grows by producing a new shell under the old, then shedding the old shell and inflating and hardening the new. Small juveniles moult frequently while mature lobsters moult once a year. Large red rock lobsters have been measured at

about 54 centimetres in body length (male) but because of heavy fishing the average length is now only half that. Average sized lobster are probably five to ten years old, with the largest being perhaps 30 or more years old. The legal minimum length (of the tail) is 127 millimetres in Otago/Otakou and 152 millimetres everywhere else. Otago has had the smaller size limit, said to be without obvious biological justification, since 1959.

Red rock lobsters are widespread around New Zealand, usually around reefs between five and 100 metres deep, though they can be found out to about 300 metres. The major South Island fisheries are in the north east of the South Island from Cape Campbell to Motunau and along the southern coasts from Moeraki to Jackson Head, including Rakiura.

Waitangi Tribunal, Department of Justice, Wellington.