Ministry for Primary Industries
Manatū Ahu Matua

Taking Stock: Oral histories about changes in marine fauna observed locally in the Hauraki Gulf and along the Otago-Catlins coast, New Zealand, 1926–2008

New Zealand Aquatic Environment and Biodiversity Report No. 173

K. Maxwell
A.B. MacDiarmid

ISSN 1179-6480 (online)
ISBN 978-1-77665-315-7 (online)

July 2016

New Zealand Government

Growing and Protecting New Zealand

Requests for further copies should be directed to:

Publications Logistics Officer
Ministry for Primary Industries
PO Box 2526
WELLINGTON 6140

Email: brand@mpi.govt.nz
Telephone: 0800 00 83 33
Facsimile: 04-894 0300

This publication is also available on the Ministry for Primary Industries websites at:
http://www.mpi.govt.nz/news-resources/publications.aspx
http://fs.fish.govt.nz go to Document library/Research reports

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Maxwell, K.; MacDiarmid, A.B. (2016). Taking Stock: Oral histories about changes in marine fauna observed locally in the Hauraki Gulf and along the Otago-Catlins coast, New Zealand, 1926–2008.
***New Zealand Aquatic Environment and Biodiversity Report No. 173.* 45 p.**

Official records of seafood harvesting levels in New Zealand did not commence until 1931 and did not enable any reliable assessment of stock status until the late 1980s. To help assess historical trends in abundance, we took an oral history approach to determine qualitative changes in resource abundance and distribution over time. In this study, a mix of 58 Māori and non-Māori individuals were willing to contribute their recollections and experiences about seafood harvesting in the Hauraki Gulf and along the Otago-Catlins coast during the mid to late 20th century, and agreed for that information to be analysed and published in the report presented here. Seventeen existing oral histories collected during the 1990s containing relevant information about fishing in the Hauraki Gulf were identified from 22 individuals representing each decadal age band from 30–39 to 70+ years. These oral histories mostly included information about fishing and shellfish gathering on Great Barrier Island from 1926 to 1999. 2008 were undertaken in the current study with individuals representing each decadal age band from 30–39 to 70+ years and observations spanning the period 1935 to 2008. Interviews were transcribed and the dialogue organised chronologically into tables for each species, or group of species, for each study area. In this report a summary of the dialogue is provided for each species or species group for each study area. The main conclusions from this study are:

1. The interviewees included as part of this project witnessed significant decreases in coastal fish and shellfish biomass over the period 1926–2008.
2. Sixty-five to eighty-five years ago, (1930–1950) fishing and gathering was a regular, sometimes daily occurrence by customary fishers in both regions. Fish and shellfish were very abundant compared with the present day and could be reliably caught with little effort, often from the shore with simple equipment.
3. It is more difficult to fish or gather most species today. Often participants reported that they now have to go into deeper water, to more distant locations or use more specialised equipment (off-shore capable boats, snorkel, and scuba) to take their catch.
4. In most cases this observed decrease in availability of fish and shellfish reflects the decline in estimated biomass based on formal catch data and stock assessments.
5. A notable exception is hapuka or groper (*Polyprion oxygeneios*). This has completely disappeared from coastal reefs in both regions where, 50 years ago, it could be caught by hand-lining from or close to shore. This information contrasts with another estimated biomass trajectory for this species group indicating little change over the period.
6. In contrast to general declines over the period, participants noted unchanged availability of barracouta and increased availability of mussels along the Otago-Catlins coast.
7. Oral histories provide a source of information about present and past fishing and gathering practices that complements the collection of official catch statistics.
8. The number of people with direct experiences of fishing in the first half of the 20th century is steadily decreasing and will approach zero by about 2030. Thus there is some urgency to systematically interview those now in their 70s and older. While analysis of the data can be delayed, the interviews cannot.

9. The approach taken in this study, using semi-structured interviews to elucidate relevant information within the context of a personal narrative, appears to be efficient and enjoyable for participants and interviewer alike. Any future interviews should focus on just a few key species to gain the maximum benefit.

1. INTRODUCTION

New Zealand was the last major landmass to be settled by humans, occurring around 1230–1280 AD (Wilmshurst et al. 2011). Consequently, New Zealand has a short and reasonably complete archaeological, historical and contemporary record of human exploitation of marine resources compared to most other places, where the earliest evidence of human impacts on marine ecosystems is difficult to discern because of climate fluctuations and changes in sea level (MacDiarmid et al. 2016). The collaborative multi-disciplinary Taking Stock project (ZBD200505), commissioned by the Ministry for Primary Industries (previously Ministry of Fisheries), has the overall objective of determining the effects of climate variation and human impact on the structure and functioning of New Zealand shelf ecosystems over the timescale of human occupation.

To achieve this overall objective the project addresses five specific objectives. Specific Objective 3 is relevant to this report. Its aim is to collect additional oral histories from Māori and non-Māori fishers and shellfish gathers regarding the distribution, sizes and relative abundance (compared to present availability) of key fish and invertebrate stocks in two regions during the 20th century before the start of widespread modern industrial fishing. Two separate reports, Parsons et al. (2009) and the present report, contribute to addressing this specific objective. Parsons et al. (2009) used anecdotal accounts of the fishery for New Zealand's snapper (*Pagrus auratus*) fishery to highlight the risk of shifting baselines in its perceived abundance. The present report has a more general focus on oral histories of marine fauna state and use in the Hauraki Gulf and along the Otago-Catlins coast 1926–2008 (Figure 1).

These two regions (Figure 1) were chosen as case studies of the broader New Zealand wide changes as they were both settled by Māori at about the same time, but have since experienced contrasting trajectories in human population size and marine resource use (Pool 1991, Smith 2011, MacDiarmid et al. 2015). While Māori rapidly explored and settled all the three main islands, the Chatham Islands to the east, and as far south as the sub-Antarctic Auckland Islands, the main center of settlement and growth was the northern half of the North Island, including the Hauraki Gulf region, where a more benign climate allowed the cultivation of a greater range of tropically derived crops (King 2003). At the time of Captain James Cook's arrival in New Zealand in 1769, only about 6000 Māori are thought to have lived in the whole of South Island, including the Otago-Catlins region (Pool 1991). European settlement followed a similar pattern (King 2003). Importantly, both the Hauraki Gulf and the Otago-Catlins regions have sufficient prehistoric, historic and modern information about marine resource use to reliably indicate the pattern and magnitude of human impacts on the marine environment. While records of commercial catches of fish and shellfish in both regions extend back to 1931 (McKenzie & MacDiarmid 2012), records concerning the extent of customary catches are fewer and often the information is retained only as oral histories and personal anecdotes and never recorded.

Oral histories can provide information that may not be available from official catch records. Parsons et al. (2009) used oral histories collected from recreational fishers to expand the range of information available to understand changes in the availability of snapper (*Pagrus auratus*) in the Hauraki Gulf. In the Gulf of California, oral histories have been used to help quantify the population decline of fish, sharks and marine mammals (Saenz-Arroyo et al. 2005, Lozano-Montes et al. 2008) over periods for which few other data exist. Similarly, Bunce et al. (2008) used fishers' perceptions to document the degradation of reef fisheries in the

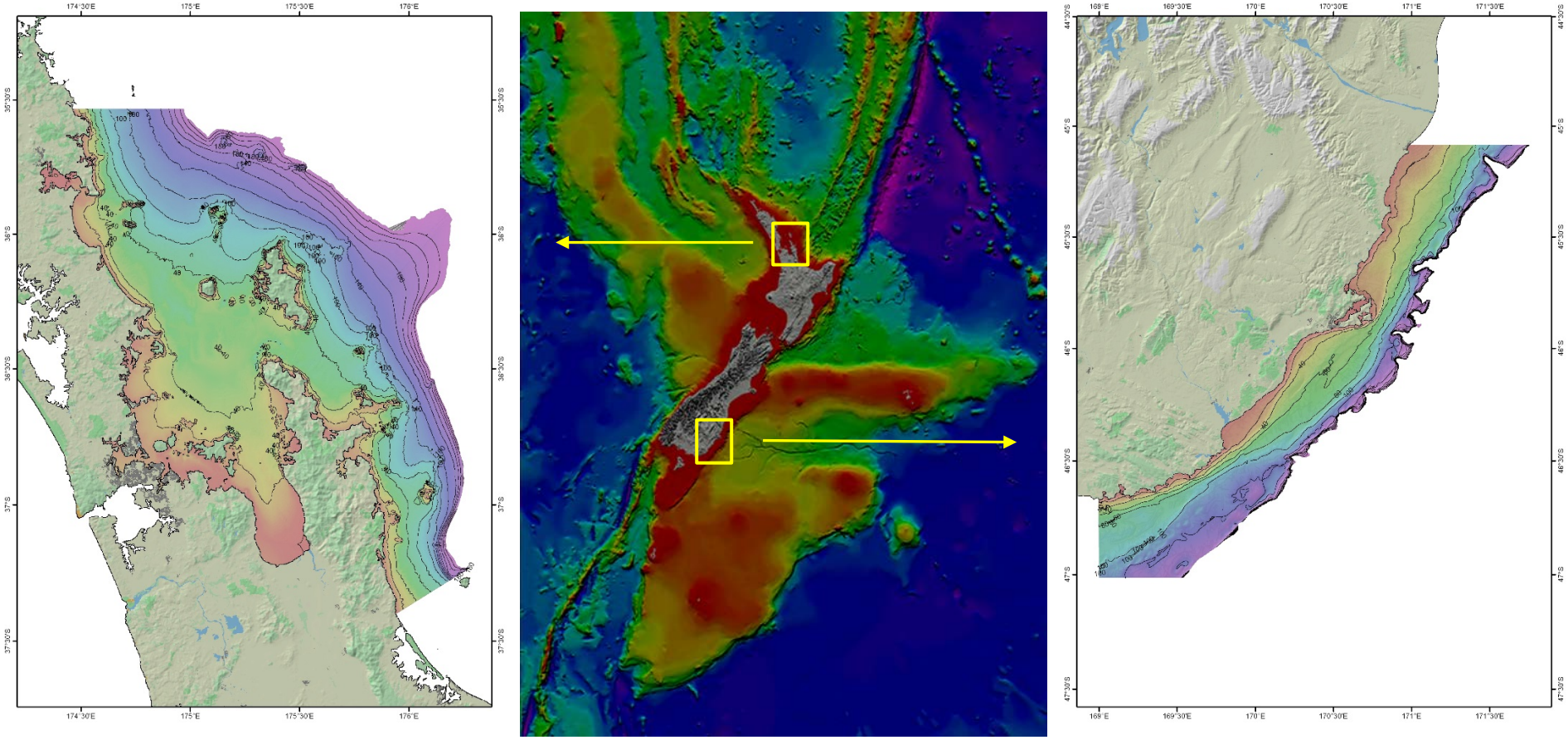


Figure 1: Map of New Zealand (middle panel) indicating the location of the Hauraki Gulf (left panel) and Otago-Catlins (right panel) study regions (coloured bathymetry).

tropical Indian Ocean, and Coll et al. (2014) assessed changes in biodiversity in the Spanish Mediterranean and Gulf of Cadiz using fishers' perceptions. These studies suggest that fishers can provide clear information on where they formerly fished and where they currently fish, thereby providing an indication of spatial changes in availability of particular species. Moreover, fishers often have clear memories of when they caught their largest individual of a particular species, or made their largest haul of a particular species (e.g. Saenz-Arroyo et al. 2005, Lozano-Montes et al. 2008). If these accounts are collected from individuals with experience in different decades then a sequence of changes in distribution, abundance and size may emerge. These can be particularly valuable if the catch or biomass time series based on reliable quantitative data were initiated comparatively recently. For instance, biomass estimates for cockles or tuangi (*Austrovenus stutchburyi*) in some harbours and estuaries along the Otago-Catlins coast, are available intermittently from 1984 only (Ministry of Fisheries 2010). In such circumstances, oral histories of fishers could provide an indication of stock size distribution and health for the prior 40–50 years and for a greater range of localities in the region.

Oral histories can be collected in a variety of ways. Unstructured interviews allow the participants to tell their story in their own way and although often enjoyable for the participant, can inadvertently miss important details (Lindlof & Taylor 2002). On the other hand, highly structured interviews in which participants are asked a series of specific questions is most useful when looking for very specific information. Structured interviews keep the data concise and reduce researcher bias but they can miss related information that the interviewer was unaware of when formulating the questions. Participants may also find this style of interviewing rather impersonal (Kvale & Brinkman 2009). Semi-structured interviews offer some of the freedom of an unstructured interview to explore participants' responses but also have a core set of questions to be asked during the course of the discussion. The more relaxed nature of this interview style often suits participants who have a close association or knowledge of the subject matter (Cohen & Crabtree 2006).

2. METHODS

Oral histories of fishers were obtained through two methods: a search of relevant libraries for existing oral history recordings, and a series of voluntary semi-structured interviews.

2.1 Archival search

A search of relevant archives was conducted to identify existing recorded oral histories that may be relevant to the study (Table 1). These included audio and video/DVD references. The Alexander Turnbull Library Oral History Unit catalogues these references but can only be accessed in person via appointment at the Unit. The catalogue was searched using the subject search option. The Hocken Library archives and manuscripts catalogue was accessed via the online search engine *Hakena* using the 'broad search' and 'subject' search options. The New Zealand National Film Unit online audio-visual archives wiki was used to search its catalogue. The New Zealand Film Archive catalogue was accessed via the online advanced search engine. The Sound Archives New Zealand online catalogue was accessed and a simple search of the main database conducted using the search term 'fishing.' The NIWA catalogue was accessed via NIWACat and searched using the advanced search of audio-visual items. The Wellington Public Libraries catalogue was accessed via its website and searched using the advanced search of DVDs. Voyager, the New Zealand Maritime Museum online catalog contains the New Zealand Maritime Index References. These were searched using the structured search with fishing as the descriptor. The search word 'fishing' was used to locate relevant articles. The

literature was considered relevant if the subject content of the recording included references to fishing or shellfish gathering in either of the study areas and the informant was born prior to 1960.

These searches were time consuming as some libraries did not differentiate between audio/visual and other record types so records found in the database search had to be individually accessed and viewed to determine whether they were audio/visual or contained audio/visual components. If the record was audio/visual it then required someone to analytically listen to or view it to determine its relevance which again was a time-consuming process. There were many records with fishing as a keyword. In addition there were costs involved with accessing some of the records (up to $100/ h of audio). Because of these difficulties, it is possible that some relevant existing oral histories may have been missed.

Ultimately 17 interviews involving 22 fishers from the Hauraki Gulf region were accessed from 15 useful "files" held by the Alexander Turnbull Library Oral History Unit. Another eight records from the Hocken Library, two from the Maritime Museum, four from the NZ Film Archives and seven from the Radio New Zealand Sound Archives were not accessed because they were judged from the abstracts available to not contain sufficiently detailed material for this project. Copies of interviews with relevant information were obtained, reviewed, and the relevant dialogue transcribed. The dialogue was then grouped by species and sorted by year into a table that included a column for each of the following references if given: time period, location, experience type (fishing/shellfish gathering/ observation), fishing method (if fishing or shellfish gathering was the experience type), species, information source and the dialogue in question.

2.2 Semi-structured interviews

Semi-structured interviews of Māori customary fishers along the Otago-Catlins coast were conducted. This approach, structured along the lines recommended by Huntington (2000), provided the opportunity to explore the participants' experience of fishing for specific species and allowed them to raise issues which they considered to be important. Semi-structured interviews have been used elsewhere to elucidate customary fishers' knowledge (e.g., Bunce et al. 2008, Lozano-Montes et al. 2008, Parsons et al. 2009). Potential participants were identified using the following purposive sampling method (i.e. one that targets specific predefined groups). The target participants were people from each decadal age group from 20 years of age who regularly fished or gathered shellfish or had previously done so within the study area. They were identified by initially contacting the *Kai tahu sub-tribe authority* offices in the study area by phone and email, which was followed up with a letter and hard copies of the project brochure and project brief for potential participants (Appendices A and B). Additional participants were identified via snowball sampling (i.e., suggestions from the first participants), NIWA colleagues, fishing websites and fishing club advertising. Potential participants were contacted by phone and the project discussed. Of the potential participants identified and contacted, 41% consented to be interviewed. In some cases two people were present during an interview and for one interview there were 13 people present.

The interviews took place from 26–30 March 2008 and 4–13 November 2008, in a location specified by the participant (usually their home or workplace), and were 40–90 minutes long. Participants were asked to read a copy of the project briefing (Appendices A and B) and sign two consent forms (interview participation and use of information, Appendices C and D). Where consent was given, interviews were recorded using a digital recorder. During the

interview the participant was asked questions about their fishing and shellfish gathering experiences (Appendix E). With the participant's agreement, notes were taken during the interview and in some cases photos and samples were also taken.

Table 1: Library databases searched, search terms used, number of hits, number of useful documents found and the number of records accessed.

Library database	Search terms	Hits	Potentially useful documents	Records Accessed
Alexander Turnbull Library Oral History Unit	Fishing-New Zealand-Auckland Region	9	8	Yes
Alexander Turnbull Library Oral History Unit	Fishers	8	1	Yes
Alexander Turnbull Library Oral History Unit	Fishing	20	6	Yes
Alexander Turnbull Library Oral History Unit	Māori-Fishing	15	0	-
Alexander Turnbull Library Oral History Unit	NZ fishing history oral history project	8	0	-
Hocken Library	Fishing-Broad search	97	0	-
Hocken Library	Fishing-Subject	9	8	No
National Film Unit of Archives New Zealand	Fishing	39	0	-
National Maritime Museum	Shellfish	2	0	-
New Zealand Maritime Index	Fishing	50	2	No
New Zealand Film Archives	Fishing-Audio	0	0	-
New Zealand Film Archives	Fishing-Film, before 1950	69	4	No
NIWA catalogue	Fishing, audio-visual	18	0	-
Radio New Zealand Sound Archives	Fishing	360	7	No
Wellington Public Library	Fishing-DVD	62	0	-
Total		766	36	15

2.3 Transcription and collation

Each interview recording was transcribed by a NIWA staff member using *Express Scribe* or by TMS Transcription Services Ltd. Each interview took 2–4 days to transcribe. The transcripts provided by TMS were reviewed by the interviewer to confirm that details had been recorded correctly including spelling of fishing locations and species names. A digital and hard copy of the interview was sent out to the Otago/Catlins participants to confirm details and for their own personal reference. Each participant was given a unique information source identification number to maintain their privacy. The data were coded in a Microsoft Office Excel 97-2003 table that included a column for each of the following references: time period, location, experience type (fishing/shellfish gathering/ observation), fishing method (if fishing or shellfish gathering was the experience type), species, information source and the dialogue in question. By creating a drop down menu for each column, all of the dialogue referring to a particular species could be grouped and entered into the table.

A table for each species, or group of species, and study area was constructed. For example, there are tables for "Rock lobsters – Hauraki" and "Rock lobsters – Otago/Catlins". The tables were arranged alphabetically by species and within each table dialogue was organised in chronological order. Some tables contain related groups of species. For example, the flatfish table includes several species of flounder (although these were often not distinguished by the participants), the hapuka or groper tables consists of two species that most participants did not distinguish (i.e., hapuka, *Polyprion oxygeneios* and bass, *P. moeone*), and the sharks and rays table contains anecdotes and observations of many species. In Table 2 a tick (✓) indicates that a species table was constructed. Because of confidentially considerations, the tables of dialogue by species are not provided in this report and are held in a database by NIWA on behalf of the Ministry for Primary Industries. If access is required, permission should be first sought from the Ministry.

Table 2: Species or groups of species included in the oral histories in the Hauraki and Otago-Catlins regions. A tick indicates that a species or group table was constructed and is held in a confidential database by NIWA on behalf of the Ministry for Primary Industries.

Species or group	Species name	Hauraki	Otago-Catlins
Dolphins and Whales	-	✓	✓
Seabirds	-	✓	✓
Sharks and Rays	-	✓	✓
Finfish			
Barracouta	*Thyristes atun*	-	✓
Blue Cod	*Parapercis colias*	-	✓
Flatfish	*Rhombosolea leporine, R. plebeian, R. tapirina,*	✓	✓
General & rarely mentioned species	-	✓	-
Hapuka or groper	*Polyprion oxygeneios* and *P. americanus*	✓	✓
John Dory	*Zeus faber*	✓	-
Kahawai	*Arripis trutta*	✓	-
Kingfish	*Seriola grandis*	✓	-
Red Cod	*Pseudophycis bachus*	-	✓
Snapper	*Pagrus auratus*	✓	-
Sprats and Piper	*Sprattus antipodum, Hyporhamphus ihi*	✓	-
Tarakihi	*Nemadactylus macropterus*	-	✓
Rock Lobster	*Jasus edwardsii, Sagmariasus verreauxi*	✓	✓
Molluscs			
Cockles	*Austrovenus stutchburyi*	-	✓
Mussels	*Perna canaliculus, Mytilus galloprovincialis*	✓	✓
Oysters	*Saccostrea glomerata, Crassostrea gigas, Tiostra lutaria*	✓	✓
Paua	*Haliotis iris, H. australis*	✓	✓
Scallop	*Pecten novaezelandiae*	✓	-
Shellfish - other	-	✓	-

3. RESULTS

3.1 Number, distribution and age of interviewees

Seventeen existing oral histories containing relevant information about fishing in the Hauraki Gulf collected during the 1990s (1991–1994 except for one in 1999) were identified from 22 individuals representing each decadal band from 30 to 70+ years (Table 3). These oral histories mostly included information about fishing and shellfish gathering on Great Barrier Island (Figure 2) and also parts of the Coromandel (Kennedy Bay, Whitianga) and Whangarei. Nineteen interviews involving 36 people from the Otago/Catlins region were undertaken with individuals representing each decadal age band from 30–39 to 70+ years (Table 4). These oral histories included information about fishing and shellfish gathering across the entire study area (Figure 3).

Table 3: Number of participants per age category (Alexander Turnbull Library). Source No. = each interview session was allocated an identification number. When there was more than one participant in an interview the individuals are distinguished by letters

Age category	Number of people interviewed	Source No.
20–29	0	-
30–39	1	2
40–49	4	6a, 6b, 8a, 16
50–59	6	5, 8b, 9, 10, 13, 17
60–69	3	4, 7a, 7b,
70+	6	3, 12, 14a, 14b, 15a, 15b
Unknown	2	11, 1
Total	22	

Table 4: Number of participants per age category (Otago/Catlins interviews). Source No. = each interview session was allocated an identification number; the letter refers to different people present in the same interview.

Age category	Number of people interviewed	Source No.
20–29	0	-
30–39	3	32a & b, 34
40–49	2	33, 36
50–59	6	18a, 18b, 19, 25, 26a, 26b,
60–69	18	20a, 20b, 22a-m, 23, 35, 28
70+	7	21, 24, 27, 29, 30a & b, 31
Total	36	

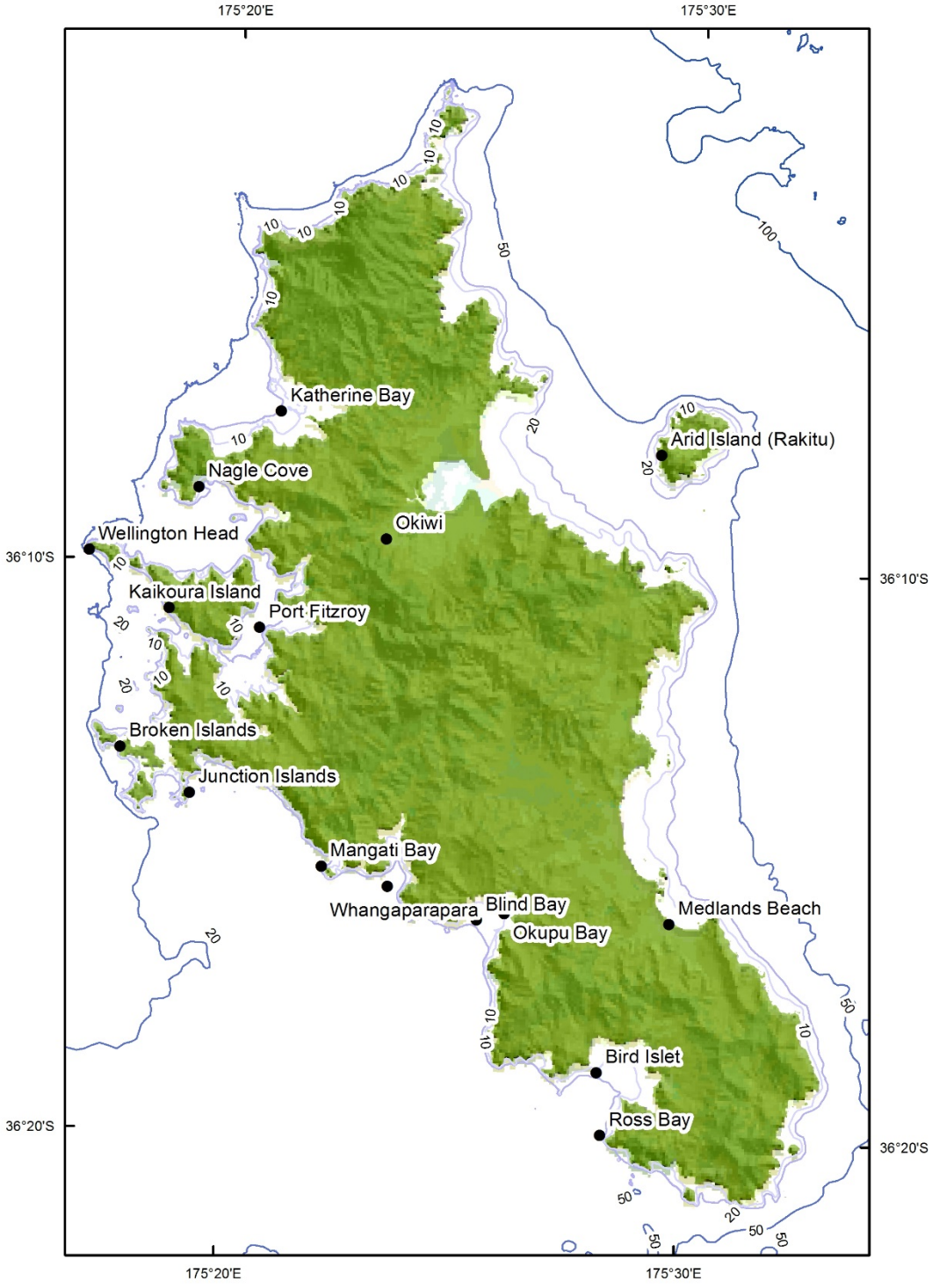


Figure 2: Map of Great Barrier Island showing the place names mentioned in the text.

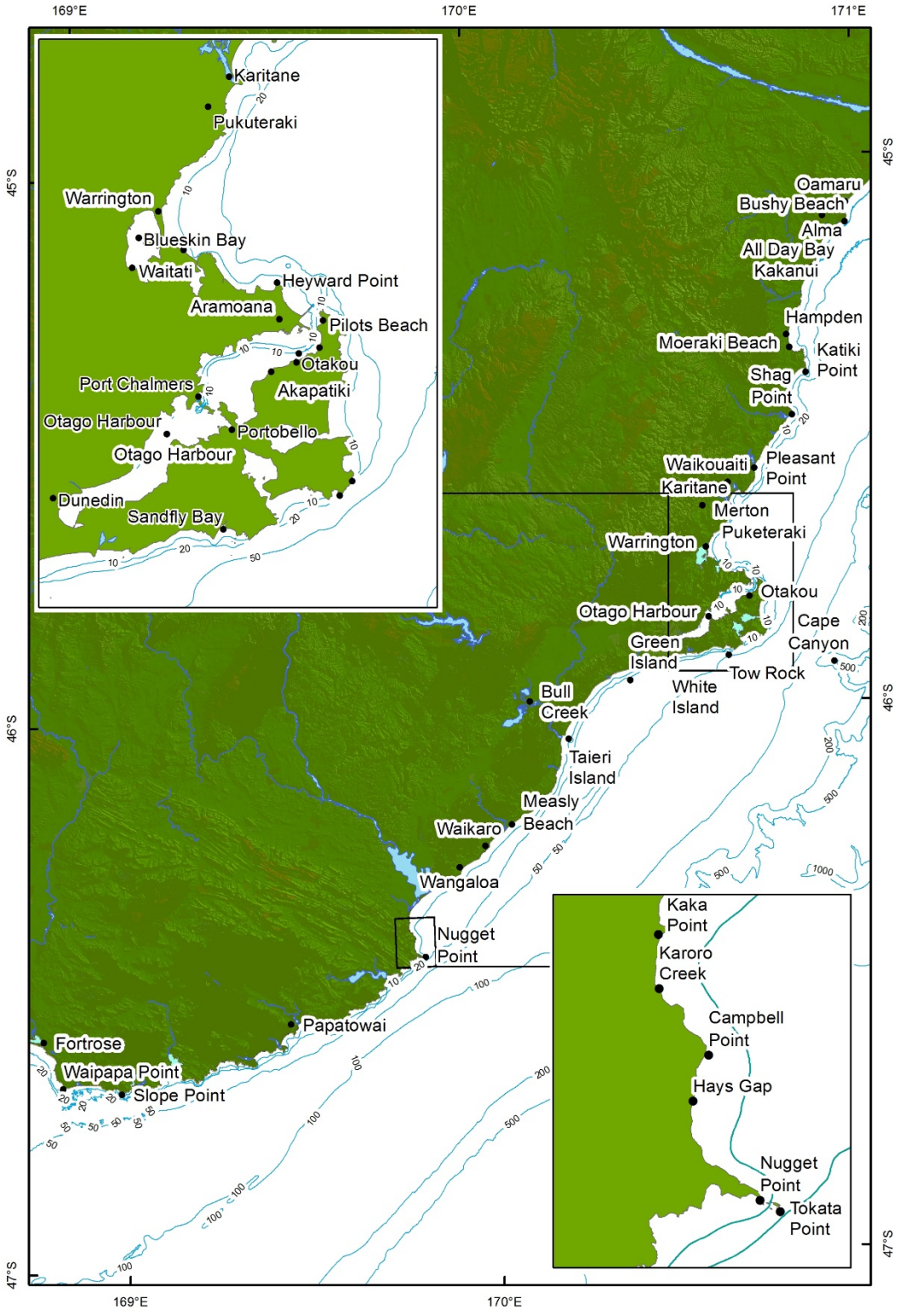


Figure 3: Map of the Otago-Catlins region showing the localities mentioned in the text. Insets show greater detail for the Otago Peninsular and Harbour, and Nugget Point.

3.2 Hauraki species summaries

Below are summaries for each category of marine life in the Hauraki Gulf study area for which there was sufficient information to make some inferences about changes in harvest practices and/or catches. The full transcripts by species are held in confidence by NIWA on behalf of the Ministry for Primary Industries.

Hapuka or groper

Four participants recalled that hapuka formerly were easy to catch in the period 1938 to the 1960s relatively close to shore, by hand-lining from row boats or small launches but by the the time of the interviews (1990s) hapuka were no longer available close to shore. Hapuka were caught at Kennedy's Bay on the Coromandel Peninsula and on the western, Hauraki Gulf side of Great Barrier Island (GBI) at Whangaparapara, Katherine Bay, Wellington Head, Broken Islands and Ryers Broke. Fishing at low tide was a preferred method. Because of the lack of refrigeration, people fished only for short periods (30–60 minutes) to obtain no more fish than could be consumed in a day. One participant recalled that in 1936–1938 off Wellington Head, hapuku were caught on the bottom on 80 yard (73 m) lines with an exceptional catch being 60–70 lb (about 30 kg). Another participant noted, *"That's the same with all the fish; you could [1960s] go out the front here and catch hapuka. Tom and I used to go out in a little old punt he had and got out to Ryers Broke and catch a couple of 'puka and come back. Only need a couple, just catch what you want. You can't get anything out there now."*

Kahawai

Participants recalled that kahawai were formerly very abundant around Great Barrier Island, often associated with flocks of seabirds. One participant remembered as a young boy in the 1920s, *"At Whangaparapara what intrigued me was the number of fish around. The schools of trevally and kahawai and young stuff that used to swim all around the jetties. You can imagine a small boy being in paradise trying to catch them."* Another interviewee recalled, "*In 1940 it was very easy to catch fish. Marvelous fishing and there were enormous numbers of seabirds. The first thing we did on the launch each morning was look for some seabirds on the water where the kahawai would be and then we would troll through the seabirds and catch 2 or 3 kahawai, sufficient for fresh bait for the day*".

The interviewees had observed a decline in the numbers of kahawai present in the area. One person reported looking out from Great Barrier Island to Cuvier and Auckland in the 1960s and seeing twenty schools of kahawai; each school an acre in size, and now (1993) seeing none. Another participant noted "*The kahawai have gone. I remember in Tryphena during the summer (1950s), the birds were so thick in there and the whole bay was just about covered with shoals of kahawai..... It's all gone now.*"

Rock Lobster

Rock lobster (crayfish) fishing was described at Cuvier Island, Kennedy's Bay, Arid Island and Great Barrier Island, specifically Medlands, Whangaparapara and Tryphena Harbour. They were caught by pole netting from the rocks, potting, free-diving and SCUBA. Formerly, rock lobsters were particularly abundant and could be caught reliably. One participant remembered that in the mid-1950s *"When I was going to boarding school I used to go to Arid Island in the holidays and the people there used to feed their dogs on crayfish because it was the only reliable source of food they could get readily each day. They'd just walk down the beach lift the pot up and take a cray out for the dogs."* Participants noted a marked decline in rock lobster abundance since the 1970s, *"We'd dive out on areas having never been dived before and it was like picking flowers out of a rose garden and you go to those areas now and there's nothing."*

Catch per unit effort was high at Medlands on the south-east coast of Great Barrier Island in 1940. "*Crayfish used to be around the rocks there. Dad caught them with a net and a pole and he would just put the net down and wait 10 minutes and lift it up and he'd have half a dozen."* However, by the 1990s it had declined; "*It's hard to get a crayfish now. Everything's gone. The big ones are gone. The packhorses [a large species of spiny lobster, Sagmariasus verreauxi] are gone."* At Whangaparapara the scenario was similar, "*At the outbreak of war [c. 1940] you could go out with one cray pot and catch 24 crayfish in one pot. Nowadays [1990s] you don't have so much luck.*" However there were contrasting views of the modern situation. One participant observed "*There's still a lot of crayfish around today, I don't think the crayfish has been affected as bad as the other fishing.*

Snapper

Fishing for snapper in the late 1940s around Great Barrier Island was easy and reliable. One participant recalled that as a young boy he was asked late one afternoon to get fish for breakfast the following morning. His mother said "*I feel like some fish for breakfast. Go down and catch a fish for breakfast" So I went out and cut a couple of pieces of meat off this piece of mutton, only about two bait bits, fishing line, a bag and a knife and hopped on the pushbike and off I went down to the middle of the beach. After about 10 minutes..... I pulled the line in and I got a big snapper on each hook [2]. I put them straight in the bag without cleaning them and I took them home. When I got home Mum said, "Oh haven't ya been fishing?" and I said, "Yes." She said, "Gosh that didn't take you long. Did you get anything?" and I said, "Yes, look." and held these two big snapper up. One was 12 lb and one was 10 lb. And that's the sort of fishing we used to get in those days and that was in the daylight and I was home before I left*".

The same participant remembered that as a boy he would see snapper in the waves along the beach with their tails out of the water after shellfish and would try to whack them on the head with a lump of wood. "*I would often get two or three like that*", he added.

During the 1950s, fishing for snapper around Great Barrier Island was still good. A man in his mid-50s recalled that "*With the fish in the [Tryphena] harbour you never had to go past Dead Rock to catch all the fish you wanted. We used to go camping in Tom Alcock's cottage and leave us his dinghy and we'd just row out to Bird Rock and we'd …… get 30 to 40 snapper and come in again."* This same participant remembered "*..we'd go to The Noisies [a group of small islands northeast of Rakino Island in the inner Gulf] on the Florence Kennedy and all those boats and you'd fish for 3 hours and you'd go back again. Everyone had a coal sack and you only had 1 m of boat to fish in and everyone would fish that coal sack up.*" He added that fishing started to fall off about 1974, and that off the Noisies "*you can sit there now [1992] and not catch a fish."*

A different perspective came from a couple who moved to Great Barrier Island in 1979. They had a houseboat/work barge converted into a fish receiving depot. They remembered that most of the fishing boats were down the southern end of the Island. They commented that "*The volume of fish [mainly snapper] has probably remained about the same and about the same number of [longline] boats that we service, most of the boats that we take fish from are local boats. We've seen no evidence of any less fish going through the depot here."* They qualified this by adding "*Possibly if you talk to people who've lived in the Bay or at the Barrier for a long time they would say forty or fifty years ago [1950s and 1940s] you could walk down off the rocks and possibly catch a fish for tea. We can still catch fish off the barge just off the end of the concrete spit but not as many as you used to be able to catch obviously."*

Anchovies, Sprats, Piper and juvenile fish

One participant recalled that to catch kahawai in 1940 they looked for the little terns. *"We called them kahawai birds, but they were feeding on the little fish the kahawai were trying to eat themselves. The little [terns] they were eating the kahawai's food and the also the ordinary seagulls were in with them but also there were big numbers of what they call stormy petrels about and they would also be feeding on the little fish that the kahawai …..and the kingfish were bringing to the surface"*.

The number of fish at Whangaparapara on Great Barrier Island intrigued one participant as a young boy in the mid-1920s. *"The schools of trevally and kahawai and young stuff that used to swim all around the jetties! You can imagine a small boy being in paradise trying to catch them."* One participant formerly fished for piper at Brasses using scoop nets made of chicken wire. Large shoals of piper and sprats observed at Nagles Cove, Great Barrier Island in the late 1970s and also in Whangarei and Tutukaka were not observed any more in the 1990s.

Whales, Orca and Dolphins

One participant remembered that in the period 1936–38 around Great Barrier Island *"There were lots of whales in those days."* This was about 20 years before the whaling station on Great Barrier Island was established at Whangaparapara. A number of the participants worked at the whaling station in the 1950s and early 1960s. One participant recalls that *"The first company started the humpback whaling station in 1956 and they spent most of their time looking for the whales in the channel between here and Coromandel. In the first year they only got 12. They didn't do much better the second year either but then in the third year they found that they were looking in the wrong area and all the whales were going up outside the Barrier past Arid Island. The following year another company took over and they took 140 whales that year. Then the whaling decreased because the Japanese and Russians were getting all the whales down off the Canterbury coast and South Island so there were none left for us and we weren't getting any. In the last few years they got right down to 12 and 10 whales for the season which didn't even pay for the fuel."*

Another former worker at the whaling station stated, *"I don't think there are as many whales now as there used to be when the whaling station was operating in Whangaparapara. I worked there for a couple of seasons. In those days there were still quite a lot of whales around. There doesn't seem to be anywhere near as much now [1994]."*

A contrasting point of view was offered by another participant, *"I've seen more [whales] between here [Great Barrier Island] and the Hen and Chicks [Islands] over the latter years [1990s] than I've seen anywhere."* Another fisherman remarked that he had seen more whales around this year (1991) than in his whole career fishing. Participants remarked that dolphins (species unstated) were always common or had increased in abundance. One noted that *"I think the dolphins have actually increased. I did a bit of commercial fishing and say 5 years ago [1989] I've seen more dolphins than I ever have seen."*

At Okupu on the southwestern coast of Great Barrier Island a participant remembered that *"For a while the [orca] came in once a year but I haven't noticed them for a couple of years now. It's been a while since we've had the orcas in."* At nearby Tryphena in 1993 another stated that *"There's always plenty of killer whales. They pass through all the time. They come right in the bay here swim around and go out again. They've always been around."*

Seabirds

Seabirds are conspicuous residents in the marine environment and five participants in Hauraki Gulf study commented on some aspect of their abundance and or behaviour. Seabirds observed on Great Barrier Island included seagulls, wading birds, little blue penguins, shags, gannets, pied oyster catchers, grey teal, grey heron and terns (kahawai birds). Some references were simply to seabirds, wading birds or penguins. One participant noted that *"The seabirds are very few [1990s] compared to what they used to see because of the lack of shoals of fish."* One person observed a decline in seagulls at Medland's, *"At night all these seagulls used to go in by the thousands and they used to sit on the beach there; there'd be acres or there would be an acre of birds sitting down the beach, a great big white mass of them. But a yes there would be certainly a decline in the bird numbers alright of the seabirds*". In the 1990s it was observed, however, that there were still plenty of wading birds still around and little blue penguins out to sea but not nesting. At Whangaparapara there were also fewer little blue penguins observed nesting. However there were more shags than formerly, especially at Shag Point, and gannets fishing. Pied oyster catchers and white faced herons were also observed at Whangaparapara. At Tryphena, gannets, seagulls and penguins were observed in similar numbers over the years, grey teal had declined, grey heron had increased in numbers and brown teal although in decline overall had seen a few good years recently. At Kaitaki Beach one participant noted that seabirds had declined in abundance. "*Whenever there was a storm over this side the birds would come in on the paddocks in their thousands and in the morning they'd fly over that way to fish and they'd come back here and land on the beach right on the Kaitaki beach. It's all gone now [1990s]*."

General comments

Many participants made general comments about the state of fishing at the time of the interviews in the 1990's compared to when they first fished. Some of the comments relate to the 1930s and 1940s. Participant 13 remembers that *"In those days you could catch all the fish you wanted off the [Whangaparapara] wharf really."* Another recalls that in the early 1930s, *"Walked to fishing spot, you didn't go out without coming back with a fish for dinner. Oh yes, in the last 7 years I've been up to the island and fished off the reef where I normally went fishing; you'd be very lucky to land anything at all now."* Yet another participant noted that *"The Island [GBI] is nothing like the place it was when I was a boy there [~1950s]. The one sad thing of course is that fishing has gone off so dramatically. People could always catch the fish that they wanted during their holiday; now it's quite difficult."*The reasons offered for the decline in fishing were varied. One participant blamed trawling, *"Again it's the big trawlers that have big nets. It's like a big scoop net in a goldfish bowl."* Another blamed foreign fishing. *"I believe it was when the Japanese moved in that the fishing went off. We could see them out there for weeks, half a dozen on the horizon and at night they'd come in and they'd drop their long lines just outside the reef there. I didn't realise they were 3-4 miles long and you'd see this buoy and it would disappear and they'd winch them back out or pull them back out again. They certainly cleaned the fish out. This was in the sixties I suppose."* The decline in scallops was blamed on summer boating tourists.

3.3 Otago-Catlins Species summaries

Below are summaries for each category of marine life along the Otago-Catlins coast for which there was sufficient information to make some inferences about changes in harvest practices and/or success. The full transcripts by species are held in confidence by NIWA on behalf on the Ministry for Primary Industries.

Barracouta

The dialogue concerning barracouta spanned the period from 1946–2008. Barracouta were caught inside Otago Harbour during summer and along the coast during the whole year. Usually they were caught for bait, but sometimes they were eaten and sometimes played for sport. There was no concern that the abundance of barracouta had changed over the period. One participant noted that, *"But no, there's still a lot of 'cuda around."* Another noted, *"Barracouta's probably one of the fish that we cook a lot of on the boat because they're so - so plentiful and everyone throws it away and hate it and all the rest of it. And I mean you can go out there and catch a couple of hundred Barracouta at the moment and it really wouldn't have any impact on the resource at all."* One proud participant had just caught his biggest barracouta. *"I got one about a month ago and I'd say it would go close to 20 lbs [9 kg] pound. It was a hell of a big fish, the biggest one I've ever seen."*

Blue Cod

Blue Cod is one of the main targeted species in the Otago/Catlins region. There were well known blue cod holes at Slope Point (spearfishing), Measley Beach, Waikaro and Wangaloa. Blue cod were also caught by the participants at Aramoana, Pleasant Point, Katiki, Cape Saunders, Cape Canyon, Taieri Rock and Tau Rock. Blue cod were fished all year round primarily using hand lines and in some instances spear-fishing.

Many participants considered blue cod to be not as easy to catch as it had been formerly. A participant in his sixties remarked that "*You can't do that now [bring up three at a time all day]. Like you're not struggling to get a feed, but you'll go from this – you know, nothing doing here and then you move on to your next patch, nothing doing there. Then you'll get one or two and a lot of small ones. Put a lot back [that are] under legal size.*" A couple in their 50s provided a graphic example in the change in size. They remembered that only a decade ago *"You know the local fishing club, if you wanted to win – they have a annual fishing competition, if you wanted to win the fishing competition you had to catch a fish [blue cod] over four kilos …..… And nowadays you know, the winning – the competition is getting won by fish that is two kilos, two and a half kilos."* Another participant recalled that because the fishing for blue cod was so good "*in the '90s….. we'd set the limit at 340 mm [40 mm larger than the legal limit] or something like that [because the fishing was good] . But now it's getting quite (inaudible) so we have to measure them just to make sure that they're legal.*"

Others noted that formerly blue cod could readily be caught off the rocks or close to shore, but now it was necessary to go off shore 20–25 km to get a good catch. However, one man in his 60s acknowledged that legal size blue cod were still available close to shore; *"I've got a little rubber ducky [inflatable boat] and once or twice I might go out from Karitane and get a feed of blue cod."*

Perversely some participants noted that the fish caught now were bigger than those caught in the 1940s–1960s because they had to go out deeper to catch them. One old fisherman in his seventies noted "*Well, they're bigger than what they were when I first started fishing [1960]"* but added that *"Yeah, well the gear that you have on your boat now, you've got very good echo sounders and that sort of stuff. You can get a way outside in the deep water and the [blue] cod are massive."*

One participant considered that the introduction of the quota management system had helped blue cod stocks; *"I think the quota systems helped a lot too. I was hard against it, I didn't believe in quotas, but I think they [blue cod] have done all right with them."*

Cockles

Twenty interviews involved discussion of cockle gathering. Cockles were a regular staple for many Māori families from the region. One participant remembers gathering cockles as a child in the 1950s living at Otakou near the entrance to Otago Harbour. "*Well when we were on holidays, or on weekends, we'd probably go [cockle gathering] every day. … And that could be as early as 6 o'clock in the morning, if the tide was right and it was summer. … we went and got cockles for breakfast, so we lived across the road from where they were. And there was some nice easy beds to access in those days.*" In the 1950s there were two sets of easy access beds at Otakou. One was knee deep and the other was over a sand bar further out in the harbour where children weren't allowed to go without an adult. The biggest cockles (6–8 cm) were further out. Four or five would be enough to feed a child.

For other participants, cockle gathering was regular but less frequent. At Waitati, one participant would gather cockles weekly, while another hand dug cockles monthly (1999–2008). "*On a good low tide you don't have to get wet while gathering the cockles or you can go any tide and they are in the middle of the estuary*". A woman recalled that her family would collect cockles once a month, after the full moon, year round, from the inlets on the eastern side of the Otago Peninsula. In Moeraki, another woman recalled that her family would go cockle gathering 2–4 times in a summer season over 20–25 years from the mid-1960s. In some places, such as the Taieri river mouth, cockle gathering was much less important. As one man in his 40s observed, "*Cockles? Don't really have a lot down this way. We do have, have them, but not, in abundance. We can get pipis and cockles, if you snorkel for them, but they're only small. So we just leave them.*" He also noted that had been the case since at least the 1970s. A woman commented that her father "*was never kind of into shellfish at all. Um, and I think that was possibly because the stocks at Moeraki had already started to decline and he didn't like to fish outside or gather outside of his own backyard so to speak, he'd always been taught to stay at home."*

A couple in their 50s reflected on the importance of cockle gathering from the Waitati as a shared family activity during the 1970s, "*Yeah, yeah. We'd go out and get cockles and all the family whanau would all be there and you would, it was, you know it was a ritual almost wasn't it?..... It was such fun then, wasn't it?"* A woman in her 60s from Otakou lamented how attitudes towards gathering cockles had changed amongst the younger generation. She recalled that two years ago [2006], one of the marae was planning its Hui-a-Tau for Ngai Tahu and contacted the Otakou hapu office for a customary fishing permit to collect get some cockles. The young person in the office said, "*Oh well look what you can do is go to Southern Clams and get some there*". That the hapu office should recommend going to a commercial supplier for traditional kai moana seemed so surprising to the people organising the hui they then contacted the participant and said to her, "*What the hell are we going to do?*" The participant said, "*Look don't worry about it I'll get them. Alright? You should have come to me in the first place. The young ones don't get them."*

Many participants noted a decline in cockle populations over much of the region over the period 1935–2008. In different places these declines were observed as a decrease in the availability of larger cockles, a decrease in overall abundance, or in a few cases, the disappearance of entire beds. A woman remembers her father showing her where the cockles 'used' to be at 'The Baths' [on the shore below Coronation Hall in Moeraki] and recalls having one tiny meal as a child. "*They were beginning to decline in the 1960's. You wouldn't find one there now [2008]. The habitat for them isn't there anymore.*"

According to participants living in the area, commercial fishing of cockle beds at the Warrington, Waitati, Blueskin Bay area has noticeably removed the larger cockles. Some recreational fishers would go out 2–4 times in a summer season over a 20–25 year period and get a 10 litre bucketful from knee-depth water. They now go out to deeper water about 70 cm deep and out in to the channel to get the good sized ones (6 cm). It takes longer to find the 6+ cm cockles; now they are mostly 4–5 cm with the odd one 6–7 cm. At Karitane one participant has a cockle bed 400 m from his house but doesn't gather from it because of pollution. Instead, every couple of months the family drives 15 minutes to Waitati and swims across the deeper water of the channel to gather cockles. The cockles there were in an inch or two of water at low tide and it would take 2 people 10 minutes to fill a bucket. Previously a full 10 litre bucket would contain 50 cockles. According to the participants from the Waitati area cockles are not as abundant as they were before commercial harvesting and it takes longer to find a good sized one (60 mm+). One participant reported that in the 1980s the average size of cockles was 59 mm and it would take 5 minutes to get a bucket load. At 59 mm you can get 300 in a 10 litre bucket. Now (2008), the 59 mm cockles are rare and the average size is 45 mm; at this size 300 cockles fills only half a bucket.

One participant gathered cockles at Otakou at the entrance to Otago Harbour from 1948 to 2008 usually at low tide at the same place. Each family group had their own cockle patch. From 1960–1970 cockles at Otakou were plentiful; on the south side of the fishery building you could get cockles and not get your feet wet. *"You could go out here and in 5 minutes get a bucketful in hard, hard sand. Now it would take nearly an hour to get a good feed and your feet sink in to the sand."* In 1979 one participant went gathering cockles at Otakou once or twice a week and gathered the largest cockles. A 10 litre bucket would contain 150 cockles. In the 1990s it took 20 minutes to fill a bucket. In the 2000s it took 30–60 minutes to fill a bucket. The participants observed that there are fewer cockles but between Weller's Rock and the fisheries building where the boats tie, the cockles never got big; they were always smallish cockles about thumbnail size. Participants noted that on the other side of the wharf for a mile up to Gill's Corner there are big cockles and that they also increase in size as you go out into the harbour with gathering sized ones occurring about a kilometre from the beach. On springtides they would dig the cockles out of the exposed sand. Participants observed that there are still cockles at Otakou, further up at Te Rauone Beach, and that they are the same size as they got in the 1960s. They also noted that there are also some cockles on the other (western) side of the harbour because the beach is sandy and not too mudy on that side.

In the little inlets around Cape Saunders one participant would collect cockles once a month after the full moon, all year around. In the 1960s the participant reported that the average size of cockles collected was the size of your hand and in 2008 the average size was 70 mm when it took an hour to collect 150 cockles.

Figure 4: Gathering cockles at Otakou in the Otago Harbour (November 2008, K. Maxwell).

Reasons provided by the participants for the change in cockle distribution, and declines in size and abundance varied. One participant at Otakou on the Otago Harbour said "*I think the deepening of the channel, you know they dig the channel out, it does stuff them up especially over the other side where the big cockles are as well. And they die."* Another participant agreed *"Back in the 60's and then later on when they deepened this harbour, made a big difference didn't it, to the cockles? Yeah, and that's what - I've noticed here that the, you know, the beaches were all hard, but now they've got sort of silt on them."*

One participant commented *"I also noticed, no disrespect you know, like I say I'm not prejudiced but I am, because all the … [recent immigrants] they were like locusts, they took everything."* Another participant recalled witnessing a car of four people being stopped with 5 coalsacks full of cockles. At Waitati one participant noted that at low tide in the summer (2008) there were hundreds of people gathering cockles and getting their limit. At Karitane a participant observed "*There's a cockle bed right in front of our house, but we don't eat them because there's pollution.*" At Waitati one participant has noticed big changes in just the last few years. "*Yeah, places where they are commercially harvested, size has come down dramatically, you don't get cockles like they used to be, you know, (inaudible) like golf balls."*

The participants' experiences of the effects of commercial cockle gathering in the Waitati have made them determined to resist commercialisation of beds in Otago Harbour. One participant noted her concerns as follows: "*Well we don't want commercialisation in the harbour. It's as*

simple as that. Why would you? Because it just prevents not just us, as customary fishers, an awful lot of people gather there. You know, they go out with glass cases and fish for flounder when they know they are running. They go – you can get salmon. All of that sort of thing. If that becomes commercialised the only way we're going to get it is to buy it. So it kind of – it isn't just the eating of it, it's the right to gather it and make a decision and say, I'm go get cockles today, you know, and I mean it's what we should be able to do. Always."

Another participant stated it differently. *"…they can stand so much, the cockles; you can go over the other side of the harbour now, for instance now at low tide and dig a bucket full of cockles today and go back there next week where you dug them from, there'll be still a lot of cockles there. If you're going to be commercially into it, this time next week there won't be any cockles in that wee area."*

Concern by local Māori has led to a close working relationship with the staff and students of Otago University although it has taken some time for the University to research what the local hapu want them to focus on. "W*e want to know where the spat goes after the cockles release it. ….So there's three or four people doing research on cockles now. Finally, we get funding through the Sea Safe thing to bring a PhD from Vic (inaudible). He's done marine science, so he's going to spend a year on cockles and a year on paua*"

Dolphins and whales

A few participants made some observations about dolphin and whales, particularly Hector's dolphins, but also common dolphins, orca, pilot whales and humpback whales.

Hector's dolphins were observed out from Oamaru and at Karitane and Warrington. One participating couple operates an eco-tourism business and noted that they had seen lots of Hector's dolphins, adding, "*Yeah. It's our business. We're tourist operators. We love to find them, you know? ...We know where they live. … We know their habitat and all the rest of it. They're always close. They don't live out at sea. They live very, really close to shore all the time. They are an estuarine sort of an animal. They don't – yeah, they don't like blue water. They like to have that dirty harbour water*." They also commented that fishermen are, "*Still allowed to set net inside this [Otago] harbour here and yet Hector's dolphins frequently come in and out of this harbour"*. In contrast some participants that had lived at Otakou for over 70 years had never seen a Hector's dolphin at the entrance to the Otago Harbour. These same participants would have recognized Hector's dolphins as they had previously seen them along the Southland coast and on the Westland's coast. The tourist operators thought that factors other than accidental catch in fishermen's nets were causing the decline in Hector's dolphin numbers. "*….one of my arguments for a long time is that it's not, in this area particularly it's not set nets that's killing them, it's actually loss of habitat. It's their environment getting polluted because they live in these estuarine harbour areas and it's all the run off and all the rest of it. You know, the lack of - you know, it's the loss of habitat, which is their – most of the dolphins have been washed up on shores around here, you know they are full of PCBs and heavy metals and … brucellosis. That's a disease you get from cows….Yeah, from the dairy industry. So don't believe everything that's not – it's not the fishermen killing them all, it's actually – loss of habitat and pollution is probably their number one [killer]*."

Flatfish

Participants in fourteen interviews observed that fishing for flatfish (brill, flounder, sand flounder, turbot and sole) took place in harbours, estuaries and the shallow nearshore zone along much of the coast, including Alma, Mataura River Mouth, Honowea, Otakou, Akapatiki,

Warrington, Waihao, Waikouaiti, Karitane, Merton, Otago Harbour, Moeraki, Taieri River, Korora Creek, Measley Beach, Kaka Point and Fortrose. Fishing methods include dredging, netting, dragnetting, trawling, lines and spearfishing. Fishing for flatfish was often a cooperative and group affair with a number of family members or neighbours involved. One participant recalled, "*Like my parents, they used to ride an old draught horse out behind the breakers here at Waikouaiti and trawl for flounders.……and all the ruddy neighbours hang on to the neck.*" Another participant recalls floundering as a young girl at Otakou in Otago Harbour in the 1940s. "*Yeah went spearing at night. And just bought them [flounder] in and basically Mum would have the fire going on the side of the beach and we'd, they be out of the water basically put in the [pan].*" Another participant now in his 60s recalls floundering as a boy. "*At a weekend we'd go down [to Fortrose], sometimes take a boat and, like, the whole family would go. Yeah, it was sort a Sunday drive. Yeah, with friends. Yep, they had the boat. We never had a boat, but they did. So, yeah, we'd all pile in and away we'd go.*" Another couple in their 50s from Karitane indicated they had only recently stopped drag netting for flounders. " *It used to be something that we used to do all the time, you know, you'd have a few friends around and it was sort of something you'd do and once again, it was you'd have three or four people together and you'd go away and you'd go drag the river for a few flounders.*"

At all sites where flatfish were harvested participants noted a change in their abundance and/or size. In some cases a species of flatfish can no longer be caught. Participants noted that there are no flounders at Waikouaiti now (2008) whereas locals used to dragnet for them behind the breakers in the 1940s–1960s. Also at Karitane, where fishing for flatfish was regular and reliable through until the 1980s, participants report they have stopped drag netting for flounders as there have been few caught in the last 15–20 years. At the mouth of the Taieri River, participants report that flatfish have decreased in number and size. They are now smaller than pan size. The flounder at Kaka Point disappeared before 1948. Participants indicated flounder disappeared from Korora Creek and Measley Beach in the early 1970s.

Participants were more varied in their view of flatfish stocks in Otago Harbour. An older couple in their 70s and resident at Otakou near the entrance to the harbour since 1960 recalled floundering. "*But another fish you get along this beach too, and the harbour beach, is flounders isn't it? Yeah, certain time of the year. I think it's around about February and we used to get them along the beach here, but I haven't tried for years.*" One younger participant in his 30s recalled fishing for flounder in Otago Harbour. "*During the 1980s went spearing on the new moon – once a month. Went for 45 minutes to an hour, 2–3 times a month in winter. Caught pan-size 30–50 cm (12 inches). Rare to see larger.*" He claimed that in the 1990s flounder in Otago Harbour were declining and by the early 2000s they were gone. An older woman in her 60s from Otakou agreed that it's now (2008) very hard to get flounder by spearing but recalled a recent pulse in the harbor. "*Three years ago they started coming back and one person went out and got 52 in the night. What a stupid thing. Of course they're all gone.*" Contrasting observations were made by a man in his 70s also resident at Otakou. "*People still go out floundering with a spear and a torch at night… I've seen them go out here and catch about 40.*" Another man in his 30s claimed to use a set-net to catch 1½ fish bins of pan-sized flounder from the harbor, every weekend in good weather, all year around.

At Karitane a couple in their 50s blamed a change in habitat for the decline in flounder stocks. "*We just stopped drag netting for flounders. It used to be something that we used to do all the time, you know….. But now, it's – yeah, there's just nothing there and you just drag up poos now basically, just crap. Oh algae bloom and you know, weed and just crap that's growing in*

the river. It's just full of it. It's not nice clean sand any more. The habitat's actually changed, it's all nitrogen feeding the whole run off and all the rest of it, it's all just, it's just crap."

Groper

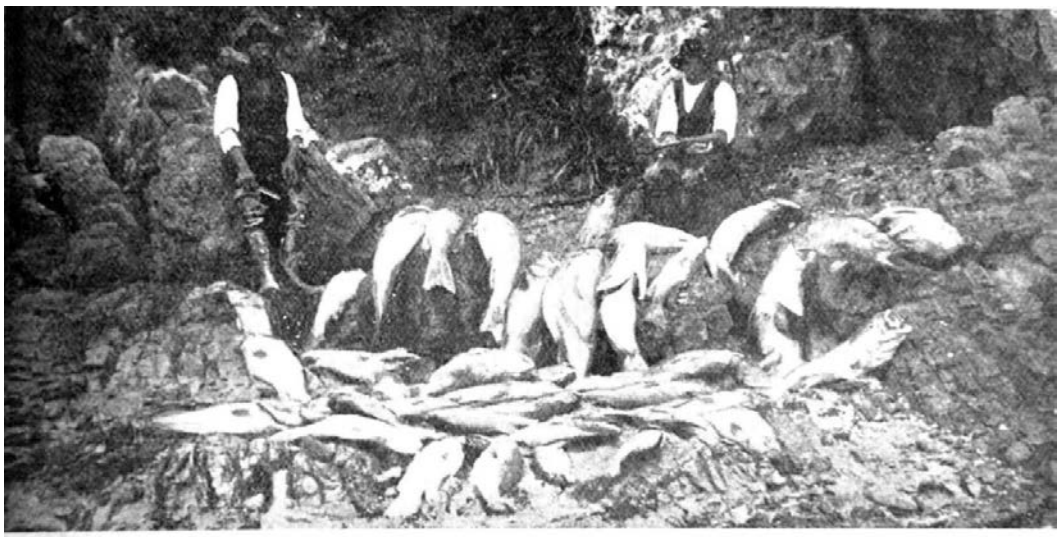
Groper (hapuka and bass) was one of the most important fish targeted by customary fishers along the Otago-Catlins coast. Participants observed strong seasonal fluctuations in availability of groper set against a longer term decline in inshore stocks. They noted that in late May each year the groper would head offshore to spawn and be gone for winter, returning inshore again in summer. However, during the 20th century the availability of groper inshore declined and participants were required to progressively fish further and further offshore. One participant provided newspaper clippings showing catches of groper from Nugget Point, Port Molyneux in 1904 and 1905 (Figures 5 and 6). Participants from Karitane reported that, "*Apparently they used to get them right close in the shore, you know 60 or 70 years ago or so [1930s and 40s]. Well I've been told that they used to catch them off the shore.*" One participant from Measley Beach recalled her father's method of shore fishing for groper. "*And Dad told me one time that they used to make a contraption, like a wee block of wood like that and they used to put hooks all round it, and they'd float that out to sea, and they'd catch the fish and pull them in that way*." Participants reported that commercial fishermen used to get groper off the rocks at Puketeraki prior to 1959. In 1960 participants used to fish for groper at the rocks of the Moeraki Lighthouse and that same year one participant recalled seeing groper caught off the rocks at Pudding Stone, near Cape Saunders on the seaward side of the Otago Peninsula.

One participant moved to Oamaru in 1975 and was told that "*They used to catch groper off the wharf in Oamaru*" but…now (2000) they are just catching little school groper and, "*its 12 miles out to where we go, off Oamaru.*" Another Oamaru resident confirmed that in 1960 he would row out with his father and catch groper in 7 m of water.

A Karitane participant recalled that at age 13 when he started fishing for groper in 1946, "*Well, it would be about 5 or 6 miles from here up [north] that way, but you'd only be a mile off shore, a mile, mile and a half off shore.*" His best day's groper fishing was in 1956 when he caught 80 in half an hour while hand-lining with four hooks on two lines on a reef 15 miles out from Karitane. His biggest fish was 20–30 lbs (11 kg) in weight. A 20 lb fish was considered good. This participant had heard of groper 80–85 lbs (38 kg) being caught but had never landed any that size himself. The last time he got any decent groper was in 1968 and by the time he concluded fishing in 1995 there were no groper to be had inshore.

Another younger participant from Karitane started fishing for groper in the late 1970s. "*Oh we were going 12 miles [offshore] sort of thing, you know, but we were catching 50, 60 bins of groper….in 100–120 fathoms. If we caught 30 bins of groper, come home, we'd be like, oh sad. We'd had a bad day. And when we were catching groper, you know, we were catching groper that was one to a fish case, you know big Bass groper that would weigh – they were weighing 40 or 50 kilos I suppose." That lasted about six or seven years and then all of a sudden you know [in the mid to late 80s] ……. the size of the groper just got smaller and smaller and smaller.* Over a ten year period the gropers were observed to have gone from a size so large that the participant couldn't lift the groper on to the boat alone, to the same size as the blue cod they were catching. *."And then in the last you know, the last probably eight to ten trips I've had out, fishing out there every time I go back out I go – I'm never going to come back and do this again – you know. And I've got to keep going back out for a look to see if there's any… fish there and there's just, just not. Oh we made a huge impact upon it [groper stocks] you know, we all had a part."* Now in his 50s the participant no longer fishes for groper

on the deep reefs off Otago. "*Yeah it's sad – it's saddening to go there now you know, to these big reefs that used to be full of groper and there's just – [nothing]"*



A CATCH OF 42 GROPERS FOR THREE HOURS' FISHING AT NUGGET POINT, PORT MOLYNEUX, BY MESSRS W. TOWNLEY AND J. LAKITIPU.
-Hull, Stirling, photo.

Figure 5: Groper catch at Nugget Point. *Otago Witness* 16 March 1904.

FISHING AT PORT MOLYNEUX: SOME DEEP SEA BEAUTIES SECURED AFTER FOUR HOURS' WORK.

Figure 6: Groper catch at Nugget Point. *Otago Witness* 18 January 1905.

Mussels

Both blue and green mussels were targeted by some participants. Mussels were gathered at Moeraki, Warrington, Karitane, Mapoutahi, Otakou, Pipikaretu, Katiki, Tūtakahikura Beach, Māteaha Head, Taieri, and Kaka Point. One participant from Kaka Point recalls that as young girl in the 1940s her family would collect blue mussels from local rocks on a daily basis. "*You used to go out into the deep water, well you know ….deep for a wee kid and … you know they were lovely big fat mussels.*" One participant would take 10 minutes to gather 80–100 green-lipped mussels while snorkelling at Moeraki, 1–2 times a year. One participant targeted blue mussels at Pipikaretu on the eastern side of the Otago Peninsula every six weeks and would gather a shopping bag full. Once each year another two customary fishers would free dive and gather a 10 kg bag of mussels in 2.5 h from the same spot at Pipikaretu. They would leave the largest and smallest mussels and target those between 80–200 mm. At Karitane one participant would gather mussels right through the year. "*Holidays, probably every second day I'll go for a dive. Ah, during the year probably about perhaps twice a month or something, once a month.*"

At Karitane participants noted there is an abundance of mussels (green-lipped and blue) on all of the rock surfaces and they are large; some blue mussels are 210 mm long. "*Yeah, there's no habitat for paua around those rocks now. It's just solid mussel*." One man in his 70s commented that at Karitane, "*Always been heaps of mussels. Starting to become misshapen because there is such an abundance – they are competing for space.*" One couple in their 50s indicated that they had noticed no change in mussel availability and very little change in size of mussels at Karitane over the last 25–30 years. An older woman who had collected small blue mussels from Pipikaretu on the eastern side of the Otago Peninsulasince the late 1940s considered they had become harder to find in the 1980s. Since then there may have been little change as one younger couple in their 30s considered there has been no change in the time to get a shopping bag full of mussels. In fact they considered that the mussels are increasing in size as fewer people are collecting them now. At Kaka Point one older woman in her 60s recalled that mussels started to reduce in availability in 1968 but that now they are coming back though are still not present on all the rocks she previously harvested them.

Oysters

The participants did not have much to say about oysters. They noted that dredge oysters are present at a few localities; at one bank in Otago Habour, Warrington, Waitati, north of the Waitaki River and off Taiaroa Heads at the entrance to Otago Harbour. They are dredged at the two latter localities. Interestingly, there were a few observations of rock oysters along the coast, which is well outside the normal northern New Zealand distribution for these species.

Paua

Paua were one of the main species targeted by the participants. They were collected at exposed rocky localities along the entire Otago-Catlins coast. For some participants and their families paua were a staple part of their diet. One older Karitane man in his 70s said that in the 1950s he, "*Half pie lived on paua.*" Another Karitane man of the same age recalled that in the early 1960s he went out almost every day to get a dozen paua because his family never had a fridge. A Karitane couple in their 50s said that their gathering of paua in the 1970s, "*sort of really depended I suppose, I suppose if there were people around and stuff like that, other people to feed, might go more regular*" and "*If we had bugger all food in the cupboard you'd have to go.*"

Acquiring paua in the 1940s through to the 1970s was relatively straightforward. Participants recalled that large paua were available even in shallow water. A man in his 60s remembered, "*…not getting your feet wet at low tide and just pulling the paua*" off reefs along the Catlins in the 1940s. A man in his 60s told of his recollection as child looking into a shallow tidal pool at Waipapa Point and being amazed by the number of large paua. "*But I always remember this pool; it was just a flat floor and these paua - huge paua everywhere…..it was just paua, it looked as though there was room for no more*." At Karitane one participant, now in his 70s recalled that he would collect paua during the 1950s whenever he was hungry and the tide was low. He got what he wanted and hardly got his feet wet. "*You were only ever in ankle deep and never swum for paua.*" A couple in their 60s, also from Karitane, remembered, "*Oh well then, in those days [1960s], it never took you very long [to collect your quota] because they [paua] were sitting on top of one another. They were just everywhere, like you know. Yeah, some of them were three high…. There was mountains of them along this coast, yeah, they were everywhere…. At a low tide, the ones that were stacked up, well the top ones, they'd be out of the water."*

A couple from Karitane, now in their 50s, recalled being taught how to collect paua in the 1960s. "*I didn't even know about paua, it was only the old Māori boys that sort of the old people you know? There was an old bloke …..and he used to you know take us away pauaing and stuff like that and show us all what to do. And you know, it was pretty, pretty special really actually going with an old guy like that and sort of you know, feeling under the rocks and getting the paua and you know this and that*."

Some participants preferred yellowfoot paua and recalled they occurred only in certain places along the coast. *They're a lot shallower, yellow foot paua. You know, but you could always get – I don't know whether it was so much they preferred the yellow foot or whether it was just easily accessible because it lived a little bit – another two or three feet shallower than the black foot, I don't know*." One participant at Karitane recalled, "*clearing a bit of rock of black foot to make space for the yellow foot sort of thing, you know? We took tonnes of paua out of there. And there was, there was just huge amount. But as we took the paua out I think - I think what happened then is that habitat wasn't getting grazed. And then all of a sudden it - you know, it's all weed infested and maybe some of the rocks not so good for settlement of young."*

Up until about the mid-1980s there was a small market for paua shell but the flesh was not highly desired. "*You know so back in the day before people wanted it, well no one really wanted it you know. The cray fishermen were using it as bait weren't they?*" Participants recalled that the biggest change to paua stocks occurred after markets for the foot were established. "*When they commercialised them, was when the biggest change in pauas came. They are now worth big dough*."

At Moeraki one participant complained that, unlike in previous times about 1998, paua were no longer obtainable by walking along the rocks at low tide, and that the paua are getting smaller. "*The big ones are going and the most common sized paua are undersized you know 100–115 mm ah when the legal size 125 mm. I mean without a wetsuit ….it's really hard to get a feed. You need a wetsuit to catch paua today.*" A couple in their 50s from Karitane suggested, "*it's getting harder all the time… you know to get a legal feed, to get a legal paua.*"

A Karitane couple in their 50s reflected on the change in paua populations. "*So [now] you have to measure most of them so. There's plenty there, but yeah, small. I know Karitane there's heaps there, but most of them are small, Warrington's probably the same. At both those place the access is pretty easy so they get hammered*." At Pipikaretu on the Otago Peninsula a

younger couple in their 30s observed that during the 1980s it would take ½ hr to get a meal of paua from waist deep water but in 2008 it took an hour of free diving for them and the average size was now smaller.

Red Cod

Until recently red cod was one of the fish least desired by the participants. A participant from Palmerston described it as "*Not a good a fish so no, I don't worry about that.*" At Karitane a participant said they normally let red cod go. "*They don't really appeal.. and we normally just chuck them back in*." In some families red cod was banned. "*Dad never let us eat red cod.*" In other families it was only used as bait.

However the situation has changed in recent years as other stocks have declined and as one participant put it, "*so now we've got to eat red cod*." Additionally some participants quite like its taste. "*So we smoked some and I kept half a dozen fillets for tea that night.…… and I quite like the flavour of red cod*". Another unknowingly ate red cod at a friend's house, "*I wouldn't eat one until we were in Christchurch years ago and the neighbours of the people we were staying with brought some fish in and we had it and, I thought oh hell that's nice fish. Akaroa Cod they call it up there*."

Rock lobster

Some of the older participants recalled that when they were children there was no major commercial fishery for crayfish. "*Dad started [fishing at Moeraki] in the 1930s. Crayfish was always plentiful, it wasn't valued as it is now. We ate crayfish often.*" At Kaka Point a women in her 60s recalled that when she was a young girl, "*The fishermen used to leave the crayfish off the bottom of the hill because there was no sale for them then. And they were big [cray] fish. I mean people don't believe me but they were big, big, crayfish, you know… not the tiny wee things you get now.*" A man recalls his grandfather telling him how he used to catch crayfish 60 years ago by sinking a bicycle wheel. "*And ….the crayfish would just walk on to it. And he'd pull it back up. And that's …. how many were around here then*." A man in his 70s recalled hand-pulling his crayfish pots off Karitane in the late 1940s when he was just 14 or 15. "*We hand pulled all our pots crayfish pots you know, we had what you call supplejack, it's like a vine you know, we used to make our own. But you hand pulled all them, - we only used to work 18 ……and that would take us all day.*"

The commercial cray fishery started changing soon after – one participant described it as a 'gold rush'. One woman recalled, "*Otakou Fisheries were started in the '50s and they were the first to export crayfish tails*." Another participant was 30 in 1970 when he started commercial fishing for crayfish out of Karitane. "He recalled that this was not a good period for crayfishing. "*First year was bad, second year was a bit better but not flash."* When he first started fishing he worked only 30 pots, then 50, then up to 100 but caught only as many crays as his predecessors did with 18 pots. "*Now there are only 5 boats fishing out of Karitane; there were 16–18 in the 1970's.*" One man in his 40s described the change in cray fishing along the Otago coast since 1980. "*You used to be able to snorkel for crayfish. Between a 20 to 10 year period things slowly got worse and then basically in the last 10 years most crayfish would be gone*."

Seabirds

Participants observed some birds to be declining and others increasing. A man in his 60s recalled "*When I first started in the '70s fishing, you know going out from Moeraki, the number of times you would see birds working, like there'd be birds working here and you'd get in there,*

in amongst them and honestly if the sea – like if the sea was really clear you'd look down and there's just a seething mass of fish and it was incredible." At Karitane, participants noted that white herons had disappeared but that spoonbills and grey herons were increasing. At Otakou there was general concern about the black swan population increasing. "*And of course the black swans. Hate the black swans as well, because, you know, when they poop on the cockle beds, you can get Salmonella poisoning*." Another participant recalled, "*I can remember being down here when I was a kid and seeing not many black swans but my pa used to shoot them. They seem to be increasing in their numbers probably over the last, 6 years*."

Seabird conservation had also caused some loss of access to former fishing and gathering areas, particularly for the participants at Otakou. "*And then it [Taiaroa Head] became – what was it, Trust Bank Royal Albatross Colony. So they dug up some of our dead – lots of our dead, and scattered them all over the peninsula and they disinterred the first lighthouse keeper and his wife and children. And they relocated them in another bay. But ours are still scattered all over the peninsula. And there's all these sort of things that are tourist dollar will, if it wins out, hasn't lost the access to those birds now; to the paua down below because that's now a protected something or other area, sanctuary for seals. I mean for God's sake, right below – they've fenced it off. And then um, they've fenced off access to Pilots Beach after a certain hour which is to preserve the penguins which are always there.*"

Sharks and Rays

Some participants mentioned sharks but mostly because they took bait meant for other species. Occasionally sharks were eaten. A few participants thought there were fewer sharks around in 2008 than in previous times but most comments were vague. Species of shark and rays mentioned included skates, blue shark, mako shark, thresher shark, basking shark, rig, dogfish, seven gill shark, porbeagle shark, and greyboys (school shark).

Tarakihi

There were mixed comments about tarakihi. Two senior retired commercial fishermen stated, "*There is a lot of tarakihi between Otago and Timaru but only a foot long in size. Between here and Moeraki on a straight line, probably five miles off the shore in about 25–26 fathom (46 m). Right to Pegasus Bay basically. Constantly, every day, every cove we'd get 30 or 40 cases of tarakihi that size [in the period 1960–2000]*." However another slightly younger participant in his 50s stated, "*They're not very common down here, the tarakihi. I've actually – since I've been fishing I've probably only caught two. I caught my first a tarakihi about – probably at Christmas [2007], my first one. I've got one since*." Another much younger participant in his 30s stated that tarakihi were 'out deep'.

4. DISCUSSION

There are few oral histories of fishing activities in New Zealand. Our search of accessible public records for both regions using the search term 'fishing' detected 766 initial 'hits' of which 36 were judged to be worthy of further investigation, which identified just 17 existing oral histories from 22 people from the Hauraki Gulf collected during the 1990s. No oral histories of fishing along the Otago-Catlins coastline were discovered. Our collection of an additional 19 interviews from the Otago/Catlins region, involving 36 people aged from their 30s to more than 70 years of age, has provided new information for the region and has substantially increased the number of oral histories of fishing activity available nationwide. However, neither set of oral histories should be viewed as an ideal sample. The Hauraki Gulf interviews were restricted mainly to Great Barrier Island and necessarily provided an outer Gulf experience where the emphasis was on fishing for species such as hapuka, snapper and

rock lobsters. Noticeably absent or very limited were commentaries on species such as mullet, flatfish, cockles, pipis and mussels, likely to be important in customary and recreational fishing and gathering in harbours and estuaries of the inner Gulf. The Otago-Catlins interviews, though widespread and covering customary and recreational fishing for a wide range of harbour, coastal and deep shelf species, were focused particularly on participants from Otakou and Karitane near the middle of the region. More interviews from northern and southern parts of the region would help to provide a more balanced overview of customary and recreational fishing along the Otago-Catlins coast.

Nevertheless, the oral histories provide an indication of the importance of kai moana to customary and recreational fishers and their household economies. Fishing and gathering was a regular, sometimes daily occurrence especially in the years before widespread refrigeration. Fish and shellfish were formerly very abundant and could be reliably caught with little effort, often from the shore with simple equipment. At Great Barrier Island in 1940, ten minutes effort with a pole net set from the rocks would yield a dozen crayfish. In the 1950s at Arid Island off Great Barrier Island's east coast a single pot would be hauled each day from the rocks on shore to provide crayfish, the staple food item for the farm dogs. In the late 1940s on Great Barrier Island young boys would be sent off by their parents to catch sufficient snapper for breakfast for the family and rarely, if ever, returned empty handed. Along the Otago-Catlins coast cockles, mussels and paua were a regular staple for many Māori families from the region. The cockle beds were easily accessible at low tide and yielded large cockles – four or five were sufficient to feed a child. During weekends and holidays children would gather cockles every day, often before breakfast. Mussels were also gathered on a daily basis by some families who lived on rocky coastlines. On the same coastline paua were very abundant and easily accessible at low tide up until the early 1980s. They were collected very regularly by some families and for others provided a convenient emergency food supply when guests arrived and nothing was in the cupboard.

In both regions the oral histories tell a story of decreasing availability and size of key kai moana species such as cockles, paua, rock lobsters, blue cod, and groper. Often participants reported that they now had to go into deeper water, more distant locations or use more specialised equipment (boats, snorkel, scuba) to take their catch. The changes occurred progressively through the period. In most cases the oral histories reflect known changes in the biomass of commercial species (McKenzie & MacDiarmid 2012). For example, the biomass of rock lobsters along the Otago-Catlins coast fell over 90% from about 13 000 t in 1950 to less than 1000 t in 2000, before rising to about 2000 t by 2006 (McKenzie & MacDiarmid 2012). Over this period the anecdotal descriptions of crayfish used by participants from the region went from "*big*", "*plentiful*" and "*eaten often*" to "*tiny wee things*" and "*basically gone*". The biomass of rock lobsters in the Hauraki Gulf declined by 80% over the period from the earliest to latest observations. Observations, similar to those for the Otago-Catlins resource, were reported by the participants. In 1940, "*At the outbreak of war you could go out with one craypot and catch 24 crayfish in one pot"*. By the early 1990s participants were stating "*It's hard to get a crayfish now. Everything's gone. The big ones are gone. The packhorses [a large species of spiny lobster, Sagmariasus verreauxi] are gone"*.

In contrast, for a few species, the oral histories provide insights into changes in stock distribution that cannot be appreciated in catch or biomass estimates for the entire region. For example, in both regions the participants provided clear observations that groper were previously seasonally available close inshore up to about 1960. Gropers have completely disappeared from coastal reefs and now are available only 12–20 miles offshore on the edge of

the shelf. According to the participants catch levels and mean sizes at these localities have also decreased. Interestingly, historical records indicate that the decline in inshore stocks of groper was noticed and commented upon even earlier in the 20th century (MacDiarmid et al. 2015). This change in distribution and availability is not reflected in groper biomass estimates which a recent study suggests have remained stable since the 1950s (McKenzie & MacDiarmid 2012). Both sources of information are unlikely to be true and suggest that the biomass assessment method used by McKenzie & MacDiarmid (2012) may not be suitable for this species. In this method the biomass of groper was scaled to that of red cod for which a reliable biomass estimate was available. The median value of the ratio of their catches in the study area was found over the period 1982–2006. Using this ratio, the total biomass for red cod was scaled to estimate the total biomass for groper but including the additional scaling of the relative catchability of groper which was assumed to be 1% of red cod.

In contrast to general declines in abundance of many seafood species over the period of the study, participants noted unchanged availability of barracouta and increased availability of mussels along the Otago-Catlins coast. This may reflect the distinct lack of commercial demand for barracouta over most of the period that resulted in just an 11% decline in their biomass since 1930 (McKenzie & MacDiarmid 2012). The reason for an apparent increased availability of mussels is unknown.

With each passing year the number of people with direct experience of fishing in the first half of the last century decreases and will approach zero by about 2030. They witnessed significant decreases in the biomass of some New Zealand coastal fish and shellfish (e.g., McKenzie & MacDiarmid 2012, Pinkerton 2015). Their eye witness accounts provide personal perspectives that complement the official catch record and in some cases provide insights that statistics drawn from the wider area cannot. Similar conclusions have been drawn from the results of systematic collection and analysis of oral histories of fishing and gathering elsewhere in New Zealand (e.g., Parsons et al. 2009) and overseas (Saenz-Arroyo et al. 2005, Bunce et al. 2008, Lozano-Montes et al. 2008).

5. RESEARCH IMPLICATIONS

There are two implications that arise from this research:

1. Oral histories provide a source of information about present and past fishing and gathering practices that complements the collection of official catch statistics. Given that the number of people with direct experiences of fishing in the first half of the 20th century is steadily decreasing and will largely disappear by about 2030 there is some urgency to systematically interview those now in their 70s and older. While analysis of the collected data can be delayed the interviews cannot.
2. The disappearance of inshore stocks of hapuka or groper in both regions is an issue relevant to the stock assessment of this species group. The most recent plenary assessment does not consider or address this issue.

6. ACKNOWLEDGMENTS

This research was funded by Ministry of Fisheries project ZBD200505 and by NIWA projects CF103119, CF113502 and WESIP1112 MS18. We are grateful to Ben Sharp (MPI) for initial fruitful discussions of the feasibility of the project, and to Mary Livingston and Martin Cryer (MPI) for project stewardship. We thank Apanui Skipper and Darren Parsons for their discussions of cultural and methodological approaches and procedures respectively. We thank

Lorraine Nelson of Kaitahu ki Otakou Ltd for initial identification and introduction to potential participants in the Otago-Catlins region and for her interest in the project. Thank you to Des Kahotea for conducting some of the interviews. The willingness of participants to share their knowledge and experiences is greatly appreciated. Thanks to Gillian Headifen at the Alexander Turnbull Library for assisting staff with research and to Ben Aves and Taoho Patuawa for assisting with editing the tables. We thank Peter Horn and Barb Hayden (NIWA), and Mary Livingston (Ministry for Primary Industries) for reviewing earlier versions of this report and suggesting numerous improvements.

7. REFERENCES

Bunce, M.; Rodwell, L.D.; Gibb, R.; Mee, L. (2008). Shifting baselines in fishers' perceptions of island reef fishery degradation. *Ocean and Coastal Management 51*: 285–302.

Cohen, D.; Crabtree, B. (2006). Qualitative Research Guidelines Project. http://www.qualres.org/HomeSemi-3629.html

Coll, M.; Carreras, M.; Ciércoles, C.; Cornax, M.-J.; Gorelli, G. et al. (2014) Assessing fishing and marine biodiversity changes using fishers' perceptions: the Spanish Mediterranean and Gulf of Cadiz case study. *PLoS ONE 9*: e85670.

Huntington H.P. (2000). Using traditional ecological knowledge in science: methods and applications. *Ecological Applications 10*: 1270–74.

King, M. (2003). The Penguin History of New Zealand. Penguin Books. Auckland, New Zealand.

Kvale, S.; Brinkman, S. (2009). Interviews, 2nd Edition. Thousand Oaks: SAGE Publications Inc. ISBN 9780761925422, 376 p.

Lindlof, T.R.; Taylor, B.C. (2002). Qualitative Communication Research Methods (second edition), Sage Publications, Thousand Oaks, CA, 195 p.

Lozano-Montes, H.M.; Pitcher, T.J.; Haggan, N. (2008). Shifting environmental and cognitive baselines in the upper Gulf of California. *Frontiers in Ecology and the Environment 6*: 75–80, doi:10.1890/070056

MacDiarmid, A.B.; Abraham, E.; Baker, C.S.; Carroll, E.; Chagué-Goff, C.; Cleaver, P.; Francis, M.; Goff, J.; Horn, P.; Jackson, J.; Lalas, C.; Lorrey, A.; Marriot, P.; Maxwell, K.; McFadgen, B.; McKenzie, A.; Neil, H.; Parsons, D.; Patenaude, N.; Paton, D.; Paul, L.; Pitcher, T.; Pinkerton, M.; Smith, I.; Smith, T.; Stirling B. (2016). Taking Stock – the impacts of humans on New Zealand marine ecosystems since first settlement: synthesis of major findings, and policy and management implications. *New Zealand Aquatic Environment and Biodiversity Report No. 170.*

MacDiarmid, A.B.; Cleaver, P.; Stirling, B. (2015). Historical evidence for the state and exploitation of marine fish and invertebrate resources in the Hauraki Gulf and along the Otago-Catlins shelf 1769 – 1950. Draft New Zealand Aquatic Environment and Biodiversity Report held by Ministry for Primary Industries, 298 pp.

McKenzie, A.; MacDiarmid, A.B. (2012). Biological parameters and biomass estimates for some commercial fish stocks in the Hauraki Gulf and along the Otago-Catlins shelf for the period 1930–2006. Draft New Zealand Aquatic Environment and Biodiversity Report held by Ministry for Primary Industries, 115 pp.

Ministry of Fisheries (2010). May 2010 Plenary Report. New Zealand Ministry of Fisheries, 1087 p.

Parsons, D.; Morrison, M.; MacDiarmid, A.B.; Stirling, B.; Cleaver, P.; Smith, I.W.G.; Butcher, M. (2009). Risks of shifting baselines highlighted by anecdotal accounts of

New Zealand's snapper (*Pagrus auratus*) fishery. *New Zealand Journal of Marine and Freshwater Research 43*: 965–983.

Pinkerton, M.H.; MacDiarmid, A.; Beaumont, J.; Bradford-Grieve, J.; Francis, M.P.; Jones, J.; Lalas, C.; Lundquist, C.J.; McKenzie, A.; Nodder, S.D. Paul, L.; Stenton-Dozey, J.; Thompson, D.; Zeldis, J. (2015). Changes to the food-web of the Hauraki Gulf during the period of human occupation: a mass-balance model approach. *New Zealand Aquatic Environment and Biodiversity Report. No 160*. 349 p.

Pool, I. (1991). Te Iwi Māori: A New Zealand population, past, present & projected. Auckland University Press, Auckland, New Zealand, 271 p.

Saenz-Arroyo, A.; Roberts, C.M.; Torre, J.; Carino-Olvera, M. (2005). Using fishers' anecdotes, naturalists' observations and grey literature to reassess marine species at risk: the case of the Gulf grouper in the Gulf of California, Mexico. *Fish and Fisheries 6*: 121–13.

Smith, I.W.G. (2011). Estimating the magnitude of pre-European Māori marine harvest in two New Zealand study areas. *Aquatic Environment and Biodiversity Report 82*, 84 p.

Wilmshurst, J.M.; Hunt, T.L.; Lipo, C.P.; Anderson, A.J. (2011). High precision radiocarbon dating shows recent and rapid initial human colonisation of east Polynesia. *Proceedings of the National Academy of Sciences 108(5):* 1815–1820.

APPENDIX A: Project Pamphlet

FISH SPECIES…
Tāmure - Snapper
Pīoke - Dogfish, Rig
Kuparu - John Dory
Kumukumu - Red Gurnard
Araara - Trevally
Haku - Kingfish
Tarakihi
Porae
Hāpuku
Kahawai

Pākirikiri - Blue Cod
Moki - Blue Moki
Nanua - Red Moki
Hoka - Red Cod
Tupere - School Shark
Aua - Yellow-eyed Mullet
Kanae - Grey Mullet
Mararī - Butterfish
Ihe - Garfish
Mohimohi - Pilchard

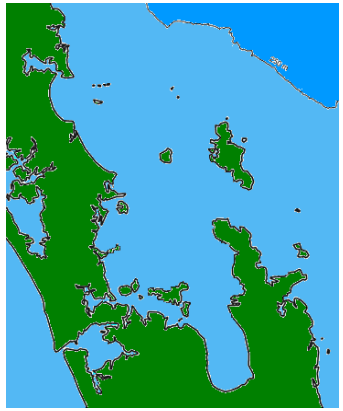
SHELLFISH…
Kūtai - Green-lipped mussels
Koura - Spiny Red Rock Lobster
Pāpaka - Red Rock Crab
Pipi
Tuangi - Cockles
Tio - Rock oyster
Pāua
Kina
Tupa – Scallop
Peraro - Trough Shell
Titiko - Mud snail
Pūpū - Cat's eye

Te Kūwaha o
Taihoro Nukurangi

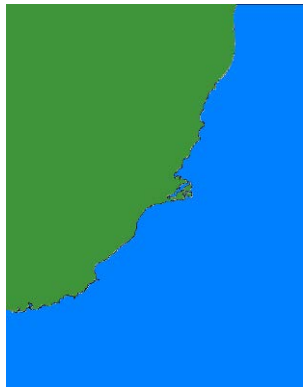
NIWA
Taihoro Nukurangi

Private Bag 14-901
Kilbirnie
Wellington
New Zealand

Greater Hauraki



TAKING STOCK PROJECT



Otago/Catlins

THE PROJECT…

You may have noticed a change in the size of bluecod in your area, or it may not be possible to collect pipi from an area where you remember getting them from as a child. We would like to record this information for you.

Our aim is to document changes in fish and shellfish distributions, sizes and abundances as observed by local fishers and shellfish gatherers in two case study areas: the Greater Hauraki Gulf (from Motutara Point to Waihī Beach, including the Islands) and the Otago/ Catlins Coast (from Ōamaru to Slope Point).

These data will be integrated with historical, archaeological and contemporary data in an attempt to model the changes in NZ's marine continental shelf ecosystems in response to human impacts and climate change over the past 1000 years.

Interviews can take place wherever suitable and will be no more than 1 - 2 hours long. Only information on species (see overleaf) relevant to the participant need be discussed. All information recorded will be in ownership of the participant and will be returned to the participant at the closure of the project.

If you would like to participate in the project or know of anyone who would be an ideal participant, please do not hesitate to pass on the brochure and/or contact us.

Regards, the Team

Kimberley Maxwell

Whakatōhea, Te Whānau-a-Apanui, Ngāti Porou, Ngāi Tai, Tainui.

Kimberley is a Customary Fisheries and Benthic Ecology technician. Her work focuses on aquaculture, surf clam fisheries and collaborative research with Māori. She will be interpreting and analysing the interview data.

Phone: 04 386 0524
Mobile: 027 224 4209
E-mail: k.maxwell@niwa.co.nz

Dr Alison MacDiarmid

Alison is a benthic ecologist at NIWA and is leading the Taking Stock project. Alison will be writing a series of publications and reports on the results of the overall project.

Phone: 04 386 0370
E-mail: a.macdiarmid@niwa.co.nz

Apanui Skipper

Te Whānau-a-Apanui, Ngāti Tamaterā, Ngāti Paoa, Ngāti Tūkorehe, Ngāti Raukawa ki te Au o Te Tonga, Ngāti Toa Rangatira, Te Aitanga-a-Mahaki.

Apanui is a manager of Te Kūwaha, the Māori Development Unit at NIWA and his work focuses primarily on fostering NIWA's relationships with iwi. Apanui will be liaising with survey participants for the duration of the project.

Phone: 07 859 1827
Mobile: 027 271 4975
E-mail: a.skipper@niwa.co.nz

Dr Darren Parsons

Darren is a fisheries ecologist at NIWA and is currently completing post-doctoral research on the Hauraki Snapper Fishery. Darren will be conducting interviews, interpreting and analysing data and report writing on snapper in particular.

Phone: 09 375 4531
Mobile: 021 170 1724
E-mail: d.parsons@niwa.co.nz

THE TEAM…

APPENDIX B: Information sheet for participants

Long Term Effects of Climate Variation and Human Impacts on the Structure and Functioning of New Zealand Shelf Ecosystems – Taking Stock Project

You are invited to take part in a study investigating the effects of climate variation and human impact on the structure and functioning of New Zealand's marine continental shelf ecosystems. Your participation in the study is entirely voluntary (your choice). You do not have to take part in the study. If you do agree to take part, you are free to withdraw from the study at any time, without giving a reason. You may take as much time as you like to consider whether or not to take part. If you require an interpreter one can be arranged.

Who designed the study?
This research project has been designed by the National Institute of Water and Atmospheric Research (NIWA). The research team consists of scientists working at NIWA (including members of Te Kūwaha o Taihoro Nukurangi, NIWA's Māori Environmental Research Group).

What are the aims of the study?
The research aims to determine what impact humans (and climate variation) have had on New Zealand's inshore fisheries, since our arrival in New Zealand to the present day. Archaeological data will provide an idea of how humans impacted the fish and shellfish resources up to about 1800, while historical data sources will be used to document marine resource use from the time of first European contact till the early 20th century. Modern fisheries time-series of catches for many species did not become well organised or established until the second half of the 20th century and have mainly focused on the commercial catch. Consequently there is a large gap in terms of what impact humans, especially customary and recreational fishers, had on fish and shellfish stocks between the 1900's and the 1960's. The experiences of local fishers and shellfish gatherers may be able to improve our understanding of human impacts on the fisheries during this period.

How many and what type of people will be in the study?
We are looking for participants who regularly fish or fished over a period of years in either the Greater Hauraki Gulf (between Motutara Point and Waihī Beach including the islands); and the Otago/ Catlins area (between Ōamaru and Slope Point). Ideally we aim to interview a total of 30 willing and available participants from each region with 4-6 individuals representing each 10 year age band from 20 to 70+ years (e.g. 20-29 and so on). Lorraine Nelson from KTKO Ltd. will be coordinating participants and looking after the interests of the participants in the Otago/ Catlins region.

What happens if I decide to take part in the study?
The study involves an interview which will be about 1-2 hours in total. This interview will be arranged at a time and place that is convenient to you. It is important that we record what you say accurately and to do this we would like to digitally record the interview and take notes. All recorded information and notes will be kept securely at NIWA and will only be accessed

by the researchers. This information will be kept in **strict confidence** by the researchers. When the project is completed (Dec 2009), all tapes and transcripts will be returned to the participant or kept in an archive specified by the participant. You will be supplied with a summary of the results in both hard copy and presentation form when this study is completed.

Compensation
The project team appreciate that participants will make a considerable commitment of their time and knowledge in order for this research to occur. NIWA are able to provide some compensation to participants for their time and travel. NIWA project members would like to present the results of the study to participants and others.

Confidentiality
All of the information that you provide will remain strictly confidential and individuals will remain entirely anonymous. All results will be presented as general conclusions about the number and sizes of fish caught in the two study areas only. Information specific to individuals will not be released as part of this project. At the end of the study the data will be stored in a secure place at NIWA, and/or in a place specified by the participant. All computer records will be password protected. All future use of the information collected will be strictly controlled in accordance with the Privacy Act.

Participant's Rights
You have the right to:

- decline to participate;
- decline to answer any particular question;
- withdraw from the study at any time;
- ask any questions about the study at any time;
- provide information on the understanding that your name will not be used;
- be given access to a summary of the project findings when it is concluded and to have your audio tape and transcript returned;
- ask for the audio tape to be turned off at any time during the interview.

Support Processes
The majority of the research team members are Māori, and as such are familiar with the appropriate protocols and procedures that should be followed. You are welcome to have a friend, family or whanau member to support you during the interview, and a research team member will be present at all times to answer any questions that participants want to ask during any of the procedures.

Project Contacts
If you have any questions or concerns please ask the researcher(s) before you sign the consent form. The consent form gives us (the researchers) permission to use the information you share with us for the purposes of this project. In giving your consent, you are agreeing for us to use what you say in any scientific reports or publications arising from the study. You will not be personally identified in any publications or at any stage of the analysis. However, it may be necessary to generally describe the age of the participant and the number of years the participant regularly fished in the area.

The research consultants are:

Lorraine Nelson (KTKO Ltd Consultancy). Research consultant assisting in facilitating the research between Kai Tahu participants and NIWA. KTKO Ltd Consultancy, P.O. Box 446, Dunedin. Phone: (03) 477 0071 Email: lorraine@ktkoltd.co.nz.

Apanui Skipper (Te Whānau a Apanui, Pare Hauraki, Ngāti Tukorehe, Ngāti Raukawa ki te Au o Te Tonga, Ngāti Toa Rangatira) Iwi Relationship Manager, NIWA. P.O. Box 11-115, Hamilton. Phone: (07) 856 7026 ext. 827 Mobile: 027 2714975 Email: a.skipper@niwa.co.nz.

The principal researchers of the study are:

Kimberley Maxwell (Whakatōhea, Te Whānau-a-Apanui, Ngāti Porou, Ngāi Tai, Tainui). Kimberley is a Customary Fisheries and Benthic Ecology technician at NIWA. She will be interpreting and analysing the interview data and presenting the results. NIWA, P.O. Box 14-901, Kilbirnie, Wellington. Phone: (04) 386 0524 Mobile: 027 224 4209 E-mail: k.maxwell@niwa.co.nz.

Dr Darren Parsons Darren is a fisheries ecologist at NIWA and is currently completing post-doctoral research on the Hauraki Snapper Fishery. Darren will be conducting interviews, interpreting and analysing data and report writing on snapper in the Hauraki Gulf in particular. Phone: (09) 375 4531 Mobile: 021 170 1724 E-mail: d.parsons@niwa.co.nz.

Please keep this brochure for your information
Thank you for reading about this study

APPENDIX C: Consent Form One – Interview participation

Long Term Effects of Climate Variation and Human Impacts on the Structure and Functioning of New Zealand Shelf Ecosystems – Taking Stock Project

THIS CONSENT FORM WILL BE HELD FOR A PERIOD OF FIVE (5) YEARS

I have read the Taking Stock project brochure and Project Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

- ☐ I agree/do not agree to the interview being audio taped.
- ☐ I agree/do not agree to the interview being video taped.
- ☐ I agree to participate in this study under the conditions set out in the Information Sheet.

Signature: ..... **Date:** .....

Full Name - printed .....

www.niwa.co.nz
National Institute of Water & Atmospheric Research Ltd
301 Evans Bay Parade, Greta Point, Wellington
Private Bag 14901, Kilbirnie, Wellington, New Zealand
Phone +64-4-386 0300, Fax +64-4-386 0574

Participant Name
Recording number:
Address:
Date of Interview:
Time of Interview:
Location of Interview:

Type of fishing discussed
- ☐ Customary
- ☐ Recreational

Age category of participant
- ☐ 20-29
- ☐ 30-39
- ☐ 40-49
- ☐ 50-59
- ☐ 60-69
- ☐ 70+

Koha provided
- ☐ Book
- ☐ Koha
- ☐ Petrol Voucher

Artefacts associated
- ☐ Yes
- ☐ No

If so, what:

Photographs taken
- ☐ Yes
- ☐ No

Numbers:

Consent forms signed

- ☐ One
- ☐ Two

- ☐ Thank you letter sent

- ☐ Transcripts and recordings returned

www.niwa.co.nz
National Institute of Water & Atmospheric Research Ltd
301 Evans Bay Parade, Greta Point, Wellington
Private Bag 14901, Kilbirnie, Wellington, New Zealand
hone +64-4-386 0300, Fax +64-4-386 0574

APPENDIX D: Consent Form Two – Use of Information

Long Term Effects of Climate Variation and Human Impacts on the Structure and Functioning of New Zealand Shelf Ecosystems – Taking Stock Project

THIS CONSENT FORM WILL BE HELD FOR A PERIOD OF FIVE (5) YEARS

- ☐ The statements recorded by the project team are true to my opinion and have been interpreted correctly.
- ☐ The statements I have made may be made available for use in a peer-reviewed publication (journal article) and popular publication (book).

Signature: ..... **Date:** .....

Full Name - printed .....

www.niwa.co.nz
National Institute of Water & Atmospheric Research Ltd
301 Evans Bay Parade, Greta Point, Wellington
Private Bag 14901, Kilbirnie, Wellington, New Zealand
Phone +64-4-386 0300, Fax +64-4-386 0574

APPENDIX E: General Questions

EXPERIENCE
In these first questions we are trying to gain an understanding of when you first started fishing and for each decade there after, the involvement you have had in customary, recreational and commercial fishing.

1. In what decade did you first start fishing? 19__s

2. Have you fished here for each decade since then?

3. Say if we break fishing into 3 categories: a. commercial, b. customary and c. recreational, which categories of fishing have you been involved in?

    1. During which years have you fished commercially? 19__ - ____
    2. During which years have you fished for customary purposes? 19__ - ____
    3. During which years have you fished for recreation? 19__ - ____

4. So that we can prioritise which species we talk about, do you mostly fish, gather shellfish or do you do both activities equally?

We are not interested in commercial experience for this interview because we expect that commercial catch data to be documented in commercial catch records and we want to avoid doubling up.

We are also focusing on marine species in this study and not freshwater species. If you would like to discuss freshwater species, then there will be time to do so at the end of the interview.

SPECIES
This next set of questions is about the species you have interacted with and observed during your customary and recreational fishing experiences. Species that you have interacted with may be fish or shellfish that you were gathering and species that you observed may have been the birds or mammals that you saw when you were fishing or gathering. We are going to focus on these species for the rest of the interview, however if you remember some more we can add them in as we go.

5. What are the main species you have fished for or gathered?

6. Do you target these species at the same time or separately?

7. Did you take note of any other important mammal, seabird or aquatic plant species when out fishing or gathering? What were these species?

CATCH PER UNIT EFFORT (CPUE)
Now we are going to ask more specific questions to gain an understanding of changes in your typical catch per unit effort over the decades. We need to know the species, fishing dates, number of fish, fishing gear and time taken to catch the fish to quantify your catch per unit effort.

8. For a typical fishing trip in the past decade, what species have you caught and in what number? Do you have any records/ photos artefacts of your catch? What fishing gear did you typically use? How long does it usually take to make that catch?

Why didn't you ask how this compared with earlier experiences of the same species in the same area?
CATCH

9. What is your goal when you head off fishing for Species 1?
    a) Reach quota _____
    b) Catch whatever I can – within quota
    c) Catch whatever I can – regardless of quota
    d) Catch a feed for myself
    e) Catch a feed for family
    f) Catch a feed for hui
    g) Other_____

Recently, what is the typical size of fish caught?WEIGHT: Are weights with or without shells for shellfish/ gutted or whole fish?

LENGTH: Can you draw on the paper the typical size and what year it is from?
What length of time would it take to catch *x* amount of fish or collect *x* amount of a shellfish using that gear (can be relative to today)?
Mixed species which is dominant?
Usual catch
Length of time to catch quota
Stay in one spot?

TIME
Here we aim to identify the length of time it takes to get your catch now and in past decades.

10. On average, how long does it currently take you to achieve that goal_____?

11. How long has it taken you in previous decades?

LOCATION

Our first specific questions are aimed at identifying any changes to your fishing location over the decades. We are not interested in the actual locations, but the distance you travelled to catch fish over the decades. *Get out map*.

12. Looking at the chart, please point to the locations you currently fish for species 1. Also the access points.

13. Next, please point out any other locations you have fished for species 1 in the past and if you can remember, tell me which decades you went there.

14. We can now measure the distance from the access points to the fishing locations.

EQUIPMENT

Our second specific questions aim to identify changes in the fishing equipment you have used over the decades. We would like to identify if there have been any changes to the equipment you have fished for species 1 with.

15. Describe the fishing gear you currently use to catch species 1 (*including mesh size for nets, brands for spear guns, fishing rods, types of line, hook size, baits, sinkers, swivels…*)?

16. Has it been the same gear over the decades?

17. Please describe the old equipment *(brands, technology, size of hooks, type of line, baits, sinkers, swivels…)* and for which decade/s you used it?

18. Are we able to take photos of the gear?

19. Have you used this same gear to catch any of the other species you mentioned?

SPECIES PRESENCE/ ABSENCE

Now we are going to ask specific questions to gain an understanding of changes in species presence/ absence.

20. Are there places where fish used to be caught/ shellfish used to be collected and now they are not?

21. Are there any **new species** present?

AN EXCEPTIONAL CATCH

22. Describe you most successful fishing/ gathering event where you caught your **largest specimen** (of a fish regularly fished for/ shellfish collected). Mention species, dates, length or weight, fishing gear and time taken to catch.

23. Describe your most successful fishing/ gathering event where you got the **most fish/ shellfish**. Mention species, dates, number of fish, fishing gear and time taken to catch.