

**IDENTIFICATION OF SUBSISTENCE FISHERS, FISHING AREAS,
RESOURCE USE AND ACTIVITIES ALONG THE SOUTH AFRICAN COAST***B. M. CLARK*¹, *M. HAUCK*², *J. M. HARRIS*³, *K. SALO*⁴ and *E. RUSSELL*⁵

A description is given of the research undertaken to provide a broad overview of the distribution and numbers of people who are subsistence or artisanal fishers and their activities along the coast of South Africa, to assist in the formulation of management protocols and to refine the existing definition of subsistence fishing. In total, 200 people were interviewed during the study, resulting in the identification of about 147 fishing communities, an estimated 28 338 fisher households and 29 233 people who potentially could be considered as subsistence fishers. Most of these fishers were found on the East Coast, more than 75% in southern KwaZulu-Natal and the former Transkei. They live in both rural and urban settings and harvest a variety of different species from intertidal, shallow subtidal and nearshore environments. Intertidal harvesting was the dominant activity along most of the East Coast, followed closely by subtidal harvesting. Harvesting nearshore resources that require the use of a boat was relatively unimportant there. By contrast, harvesting of nearshore resources was the most important activity on the West Coast, intertidal and subtidal resources being of lesser, but equal importance. Fish, rocky intertidal invertebrates and sandy beach invertebrates are harvested by subsistence fishers around the entire coast, whereas estuarine invertebrates feature prominently on the southern and northern regions of the East Coast. Certain high-value resources such as oysters (mainly *Striostrea margaritacea*), rock lobsters *Jasus lalandii* and *Palinurus homarus* and abalone *Haliotis midae* are also taken. These are not usually consumed by the fishers themselves, but are rather sold to generate income, and the people undertaking these activities should more accurately be considered as small-scale commercial fishers than subsistence fishers. A high proportion of the fishers in the South-Western Cape make use of motorized vessels. Fishers there also range over longer distances than those in other parts of the country. In general, however, subsistence fishers tend to live close to their point of harvest, mostly within 10 km. These results are discussed in the light of existing perceptions about what constitutes a subsistence fisher, and some of the difficulties in identifying criteria to define subsistence fishers and in developing appropriate management strategies are highlighted.

Key words: subsistence activities, subsistence fishers

This paper forms part of a series describing the research and recommendations of a Subsistence Fisheries Task Group (SFTG), which was appointed in 1999 by the Chief Director of Marine & Coastal Management of the Department of Environmental Affairs and Tourism to develop recommendations for the future management of subsistence fishers in South Africa. Full details on the composition of the SFTG, the reasons for their appointment and the process followed are provided by Harris *et al.* (2002).

At the start of their deliberations, the SFTG undertook to consult and inform themselves on the principal issues relating to the management of subsistence fishers. This was done through two nationwide surveys in which informants all over the country were questioned regarding the existence of subsistence fishers, the nature of their activities and their socio-economic status. This paper documents the results of the first survey.

The study was designed to obtain a broad overview

of subsistence fishing activities in South Africa. The intention was to collect information from as many fishing communities across the country as possible, to provide a broad understanding of subsistence fishing activity in all parts of the country with a view to informing further, more detailed investigations, and to assist in the development of a more concise definition of what constitutes subsistence fishing activity in South Africa. Subsistence fishers have only recently been formally recognized in South Africa and there is still much debate about exactly what constitutes subsistence use of marine resources (see Branch *et al.* 2002). Until the Marine Living Resources Act came into force in 1998, these fishers were generally labeled as informal fishers or poachers.

Numerous other studies have been undertaken on subsistence fishing activity in South Africa, but all have focused on relatively small areas, mostly along the East Coast (Tilney 1964, Bigalke 1973, Siegfried *et al.* 1985,

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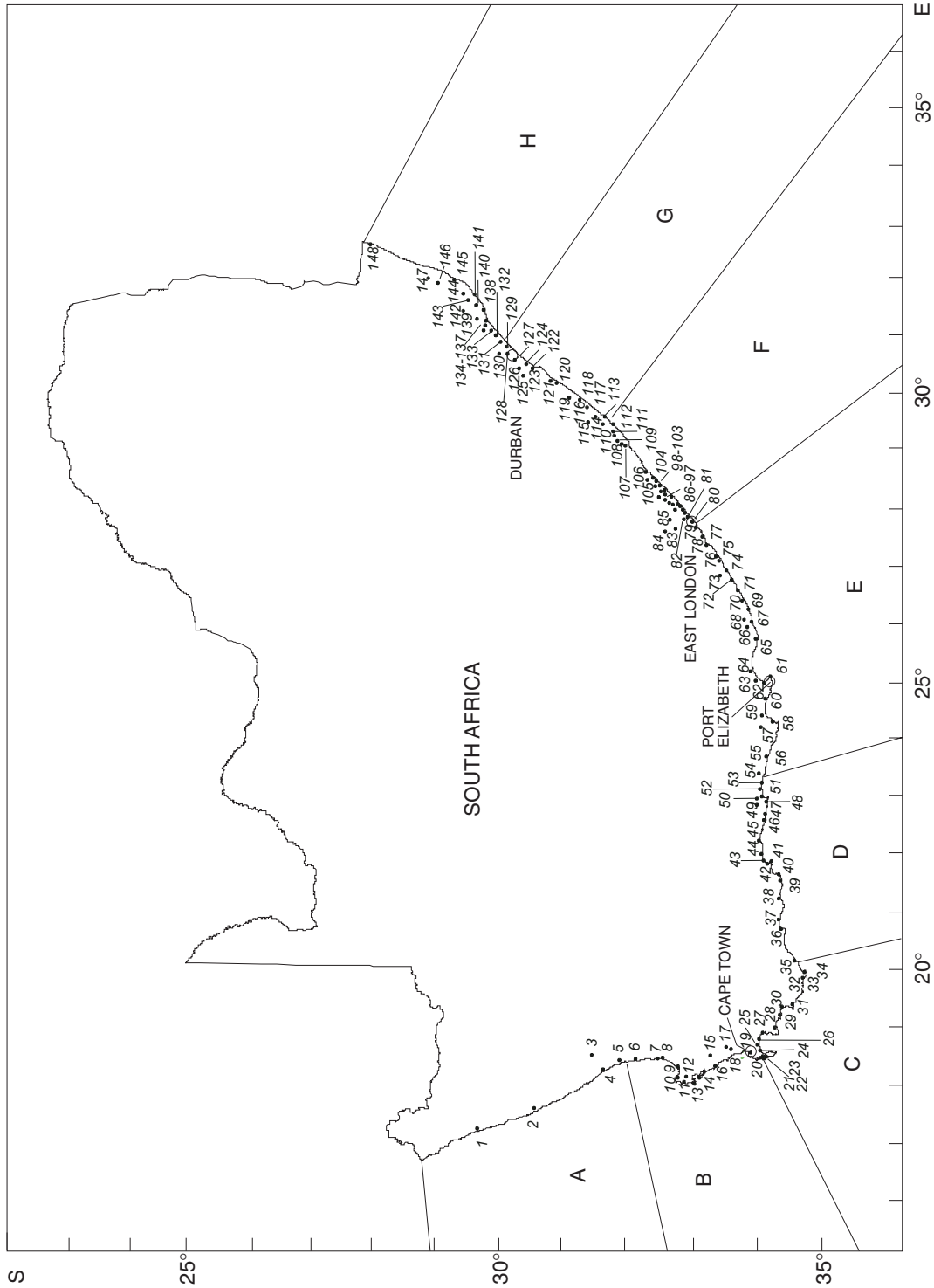
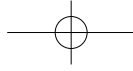
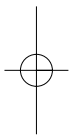
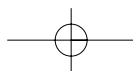
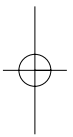


Fig. 1: Map showing the eight coastal regions (A–H) and the locations of subsistence fishing communities identified by the interviewees. The locations are listed in the Appendix



Hockey and Bosman 1986, Hockey *et al.* 1988, Lasiak 1992, Fielding *et al.* 1994, Mann 1995, Kyle *et al.* 1997a, b, Tomalin and Kyle 1998) or on the Olifants River on the West Coast (Sowman *et al.* 1997). Current understanding of subsistence fishing in South Africa is based largely on this research, and as a result is potentially geographically biased.

MATERIAL AND METHODS

For the purpose of the present study, the coastline of South Africa was divided into eight regions (Fig. 1). One regionally based fieldworker was appointed in each area to collect the data required for the study. Boundaries of each region were as follows:

- Region A Namibia border to Olifants River
- Region B Olifants River up to and including Hout Bay
- Region C Hout Bay to the Breede River
- Region D Breede River to the western boundary of Tsitsikamma National Park
- Region E The western boundary of Tsitsikamma National Park to Kei River
- Region F Kei River to Mtamvuna River
- Region G Mtamvuna River to Umvoti River
- Region H Umvoti River to Moçambique border

Each fieldworker was trained in basic interviewing techniques and was instructed to target people whom they (or the other interviewees) considered knowledgeable regarding subsistence or "informal" fishing activities in their particular region. The interviewees were

broadly classified into one of three groups – researchers, authorities and community leaders. Researchers included natural and social scientists from all disciplines involved in some way with subsistence or informal fishing activities. Authorities included fishery control officers, conservation staff and representatives from local, provincial and national government. Community leaders included formally or informally elected representatives such as the chairpersons of fisheries co-operatives and tribal leaders. The fieldworkers were instructed as far as possible to include equal numbers of people from each group to ensure that comparable results were obtained from each region. This was not always possible, however, because most of the interviewees were identified through local contacts during the course of the study.

The purpose of the survey was to obtain a broad overview of subsistence, artisanal and informal fishers around the entire country in as short a time as possible (a period of six weeks was allocated for the purpose). Therefore, in the interests of uniformity and speed, the fieldworkers were instructed specifically to avoid interviewing the fishers themselves unless they were included in one of the categories identified above. The fishers were targeted in a second, more detailed, survey of selected test cases, as reported by Branch *et al.* (2002a).

All interviews were conducted in a similar manner. Interviewees were first requested to provide personal details (contact information and professional profile) and then to list all potential subsistence fishing communities with which they were familiar. Interviewees were not given a *pro forma* definition of what constitutes a subsistence fisher, but were encouraged rather

Table 1: Breakdown of the number of interviews and communities identified, and number of households and subsistence fishers identified in eight regions along the South African coast

Region	Number of interviews				Number of communities identified			Number of households	Number of subsistence fishers
	R	A	C	Total	U	R	Total		
A	8	3	8	19	1	4	5	411	458
B	6	2	10	18	4	12	16	675	643
C	7	7	16	30	7	6	13	1 352	1 272
D	6	10	7	23	10	8	18	1 269	1 424
E	6	10	7	23	12	14	26	1 031	1 452
F	14	5	7	26	0	33	33	4 830	4 239
G	5	5	12	22	7	10	17	16 811	18 399
H	5	10	24	39	1	18	19	1 959	1 346
Total	57	51	91	200	42	105	147	28 338	29 233

R = Researchers
 A = Authorities
 C = Community leaders
 U = Urban
 R = Rural

to formulate their own ideas in this regard. They were prompted where necessary (e.g. people who fish for food, or to meet the basic needs of life), and were encouraged to disregard what they perceived to be commercial fishers (those harvesting resources solely for financial gain, as a business or a means of employment) or recreational fishers (those fishing primarily for enjoyment). The interviewees were asked to mark the location of the identified subsistence fishing communities on maps provided and to provide answers to specific questions about each community.

The number of informants providing information on a particular community varied considerably. In some cases, data obtained on a community were derived from a single interview, and therefore may be biased to some extent. Therefore, rather than trying to provide detailed information on individual communities (whose validity may be questionable), data are summarized on a regional basis.

RESULTS

Interviewees, communities and fishers

In total, 200 people were interviewed, resulting in the identification of 147 fishing communities along the South African coastline whose activities could be construed as subsistence fishing or artisanal fishing (Appendix and Fig. 1). The number of interviews conducted per region ranged from 18 to 39 (Table I). Community leaders made up the greatest portion of interviewees in most regions, whereas researchers and authorities generally constituted smaller components. Authorities made up the bulk of the persons interviewed in Regions D and E (42 and 44% respectively) and researchers dominated in Region F (55%).

Regions E and F contained the greatest number of subsistence/artisanal fishing communities (26 and 33 respectively) and Region A the fewest (5 communities; Table I). The estimated total number of subsistence/artisanal fisher households in the country, calculated from the number of households in each identified community, amounted to 28 338. Numbers of households per region varied markedly, more than 75% being reported for Regions F (4 830) and G (16 811). Regions A and B were an order of magnitude lower (411 and 675 respectively). The remaining regions contained between 1 000 and 2 000 households each. Similar patterns were evident with respect to number of subsistence/artisanal fishers in each region (Table I). Total number of fishers was only marginally more than the total number of households (29 233 v. 28 338), indicating an average of only one fisher per household.

In some of the regions the identified communities tended to be mostly urban in nature (Table I), whereas in others rural communities predominated. In Regions A, F and H, between 96 and 100% of the communities were rural. In Region B, 75% of the communities were rural, whereas Regions C, D, E and G contained roughly half of each type.

Use of resources

Interviewees were asked several questions relating to the use of resources. These included queries as to the areas in which harvesting was undertaken, the kinds of resources harvested, distances between place of residence and harvest, and the history of fishers. For simplicity and ease of analysis, resources used by the fishers were split into several broad categories, based largely on the types of organisms and the habitats in which they typically occur. The categories identified included rocky-intertidal invertebrates, sandy beach invertebrates, estuarine invertebrates, seaweed and fish. Certain "commercial" species with a high retail value were removed from these categories and analysed separately, because they are seldom eaten by the fishers themselves, but rather sold to generate income for other purposes. Species classed as high-value resources included rock lobster *Jasus lalandii* and *Panulirus homarus*, abalone *Haliotis midae* and oysters (particularly *Striostrea margaritacea*). Similarly, harvest area was categorized as being one of three possibilities, intertidal, immediate subtidal or nearshore from boats.

Figure 2 shows that the proportion of fishers harvesting marine resources exceeded that for estuarine resources in all regions except Regions D (50% estuarine) and H (60% estuarine). Region E also contained a relatively high proportion of estuarine fishers (42%), whereas in the other regions, estuarine fishers made up no more than 30% of the fishers (dropping as low as 2% in Regions B and C).

Harvesting of fish was prevalent in all regions of the country, being noted by >84% of the respondents in each region except F (39% – Fig. 2). Similarly, respondents indicated that rocky-intertidal invertebrates (34–100%) and, to a lesser extent, sandy-beach invertebrates (6–45%) are harvested in all regions of the country. Estuarine invertebrates and oysters were not harvested in Regions A or B, but they featured prominently in all other regions. The West Coast rock lobster *J. lalandii* was harvested mostly from Regions A–C (68–70%) and the East Coast rock lobster *P. homarus* from regions F–H (18–90%), whereas abalone were important resources in Regions B–F (3–68%). Seaweed was not considered to be a

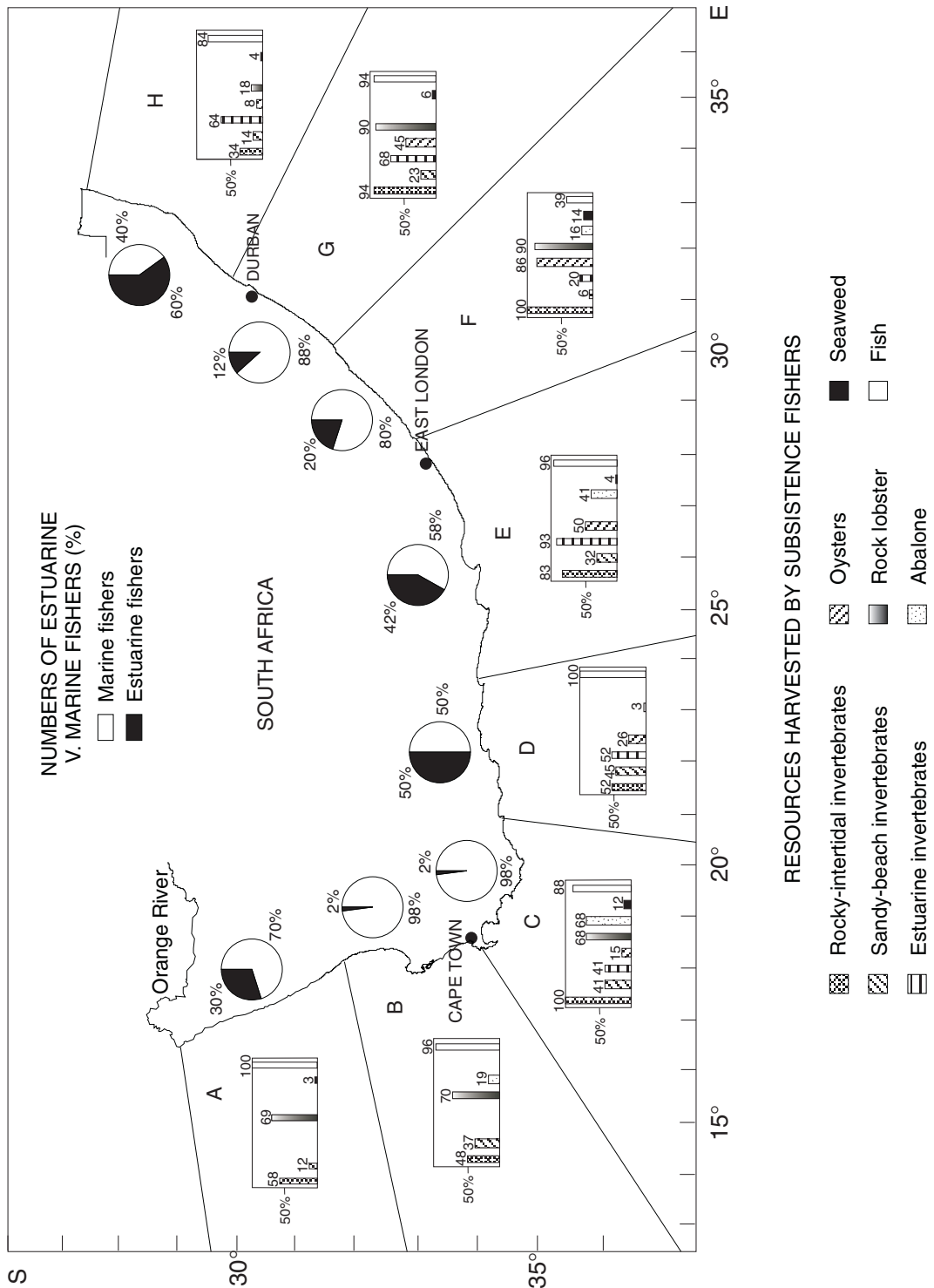


Fig. 2: Indications by interviewees of the proportions of marine and estuarine fishers, and relative importance of various different resources to subsistence fishers in each of the eight regions

particularly important subsistence resource and was only reported from Regions E–H (4–14%).

Respondents indicated that intertidal harvesting was the dominant activity along most of the East Coast (Regions E, F and G: 46–49% – Fig. 3), followed closely by harvesting shallow subtidal resources (48–52%). On the extreme North-East Coast (Region H), however, subtidal resources were considered to be more important (64%) than intertidal harvesting (27%). Harvesting nearshore resources that require the use of a boat was relatively unimportant along the whole of the East Coast (2–9%). By contrast, harvesting nearshore resources was the most important activity in the western parts of the country (Regions A, B and C; 44–56%), with smaller but more or less equal contributions from subtidal (24–28%) and intertidal harvesting (20–30%). In the intervening area (Region D), all three activities were equally important.

In Regions B and C (South-Western Cape), where a large proportion of the fishers use boats, most respondents (92–97%) indicated that more than half of their boats were motorized (Fig. 3). On the East Coast (Regions E–H), most respondents indicated that either none of their vessels was motorized (78–94%) or that less than one-half were motorized (4–22%). Only in Regions E and H was it ever suggested that >50% of the vessels in any one community were motorized (12 and 2% respectively). Regions A and D were intermediate in nature, roughly one-third of the respondents reporting that none of the vessels were motorized, one-third saying that <50% were motorized and the remaining third that >50% were motorized.

Respondents indicated that most subsistence fishers live close to their point of harvest. The average distance reported between their place of residence and harvesting point ranged between 2.1 and 15.4 km for the eight regions (Table II). Distances were greater in Regions B, C and G (all >10 km) than in Regions A, F and H (all <6 km). However, fishers seem to travel far greater distances while they are harvesting. The average length of coastline utilized by subsistence

fishers in the eight regions ranged between 6.4 and 108.3 km. Fishers in Regions B and C (the South-Western Cape) range over the greatest distances, an average of 66.2 and 108.3 km and a maximum of 200 and 700 km respectively. In all other regions, fishers ranged over an average of <20 km. Maximum range in these regions was 50 km.

Fishers in most regions around the country appear to have been involved in fishing activities for a long time. In all regions (except E), the majority of respondents (71–99%) indicated that the identified communities had been involved in fishing activities for >50 years (Fig. 4). Only a small proportion of respondents (0–14%) indicated that the communities in these regions had been involved in fishing for <20 years. Respondents from Region E indicated that most communities had been involved in fishing for <20 years (49%), and that only a small proportion had been involved for >50 years (16%). In most regions, the majority of fishers had no alternative income and of those that did, only a small minority had full-time work (Fig. 4).

DISCUSSION

Archeological evidence suggests that subsistence fishers have been active on the South African coast for many thousands of years. People are believed to have exploited intertidal resources on the South African west coast for at least 50 000 years. On the Eastern and Southern coasts, harvesting extends back for at least 100 000 years (Thackeray 1988). Excavations at nearshore caves and coastal middens indicate that people seasonally visited isolated rocky points to harvest easily accessible rocky intertidal species, including mussels, patellid limpets, whelks and winkles (Parkington *et al.* 1988, Lasiak 1992, Jerardino and Yates 1996). However, although this kind of activity seems to have persisted relatively unchanged on the East Coast, it is believed to

Table II: Distances between home and harvesting points, and average and maximum lengths of coastline over which subsistence fishers operate in eight regions along the South African coast

Region	Kilometres from home to harvest point (Mean \pm SE)	Kilometres of coastline used (Mean \pm SE)	Kilometres of coastline used (maximum)
A	2.1 \pm 0.1	12.9 \pm 0.4	30
B	11.1 \pm 0.6	66.2 \pm 2.6	200
C	15.4 \pm 1.2	108.3 \pm 5.5	700
D	8.2 \pm 0.3	18.2 \pm 0.4	50
E	7.9 \pm 0.1	9.5 \pm 0.2	34
F	4.9 \pm 0.1	6.4 \pm 0.1	50
G	10.0 \pm 0.2	10.2 \pm 0.3	50
H	5.3 \pm 0.1	10.2 \pm 0.2	50

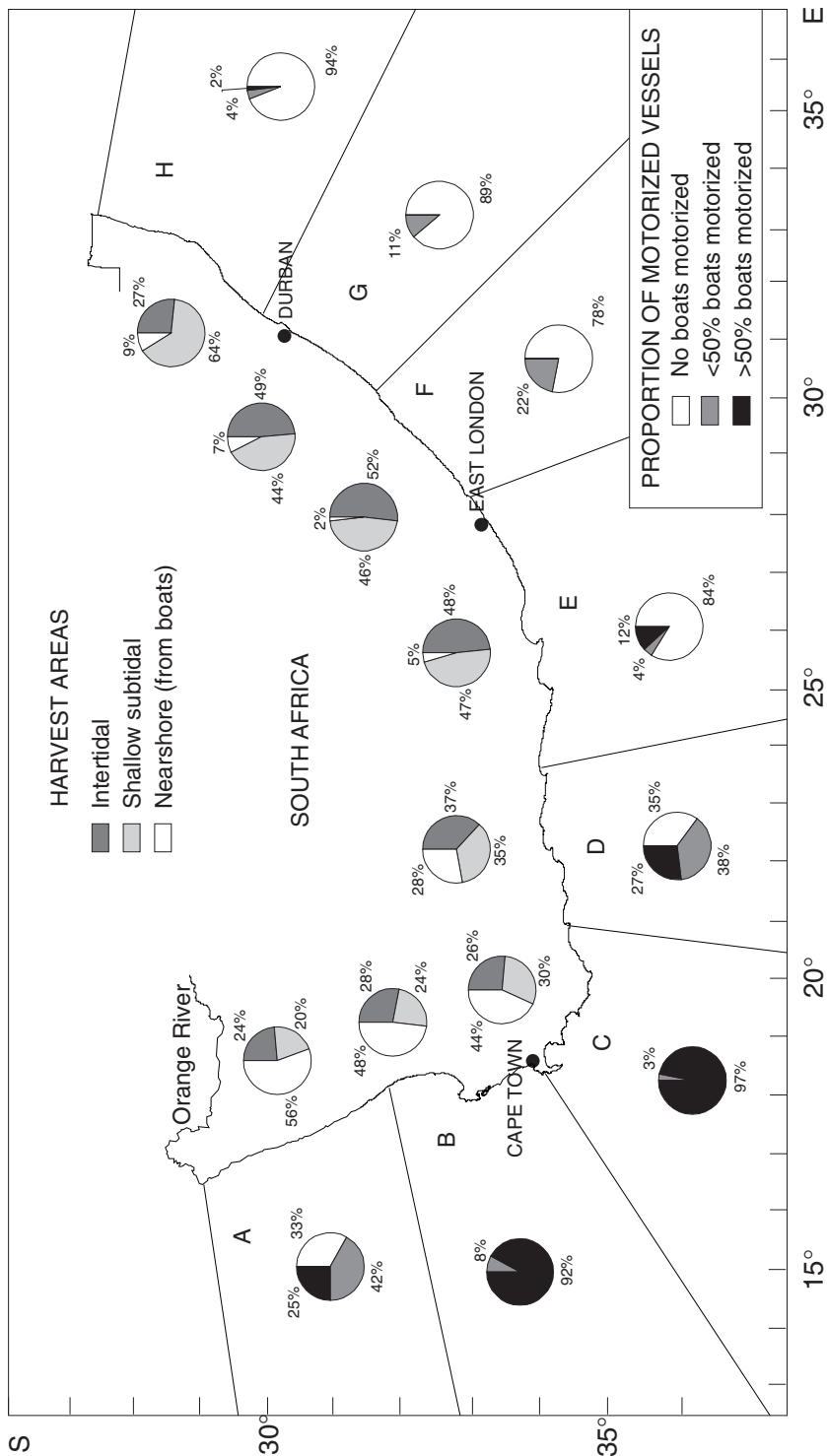


Fig. 3: Indications by interviewees of the regional breakdown of the importance of different harvesting areas (intertidal, shallow subtidal and nearshore) and proportions of motorized v. non-motorized vessels used by fishers

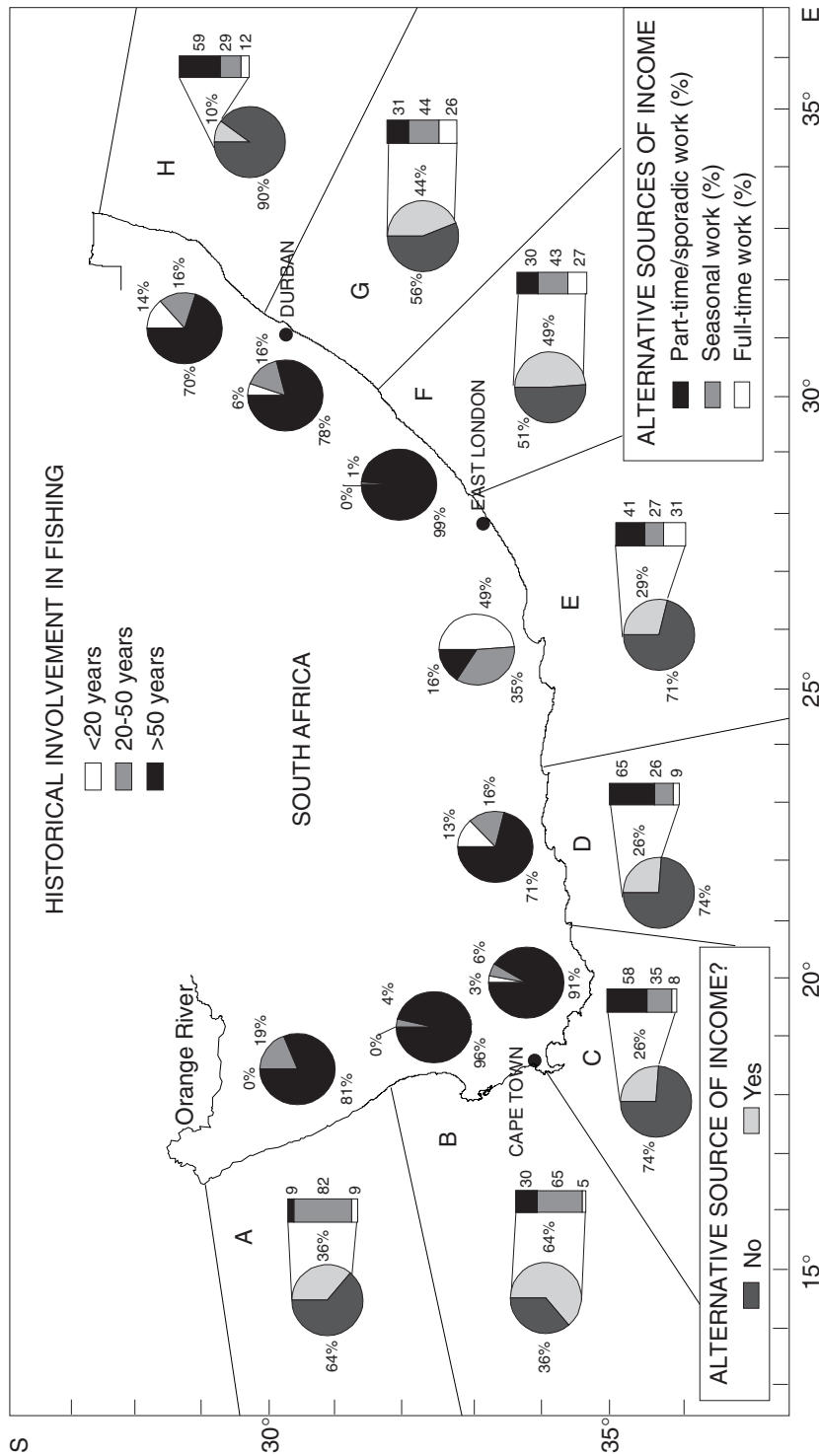


Fig. 4: Indications by interviewees of the regional breakdown of the historical duration subsistence fishing communities that have been involved in fishing, the proportion of fishers who possess alternative sources of income, and the breakdown thereof into different employment types (full-time, seasonal, part-time/sporadic)

have largely fallen away on the West and South coasts (Siegfried *et al.* 1994, Griffiths and Branch 1997). Siegfried *et al.* (1994) attribute the apparent disappearance of subsistence fishers from the West and South coasts to the arrival of European settlers in South Africa. They argue that most of the original hunter-gatherers were exterminated during colonial raids or through disease, or were used as labour by the colonists. These arguments have led to a common perception that subsistence fishers exist only on the East Coast and that they subsist exclusively on intertidal resources.

Results from this study suggest that this may not be entirely true. Although there was a strong numerical bias towards the East Coast, interviewees in all parts of the country reported the existence of fishers who harvest coastal resources as a source of food and to supplement their basic needs for food. An alternative theory may explain the present data. Instead of simply having disappeared, fishers who originally harvested marine resources primarily as a source of food (i.e. who were subsistence fishers in the narrowest sense of the word) may have adapted their harvesting methods to accommodate the needs of a changing society. In a situation where protein yield is the primary consideration and access to modern technology limited, many marine species are likely to be beyond the reach of subsistence fishers or simply not worth the effort required to harvest them. However, factors such as the development of a cash economy, the introduction of modern fishing gear (outboard motors, nylon nets, fishing line, etc.), improvements in agriculture and recent increases in coastal tourism are likely to have removed many of these restrictions. In some cases this has involved a shift to harvesting resources for cash return and not for consumption.

In areas occupied by colonists, subsistence fishers would probably have initially continued to harvest marine resources primarily for their own consumption. As financial gains became possible, particularly for resources of high cash-value, it is likely that they would have started harvesting a wider variety of resources and in quantities greater than they could consume themselves, in the hope that they could barter or sell a portion of their catch. Such fishers would begin ranging over longer distances while harvesting and they may have been forced to travel farther to reach suitable harvest areas and would no longer be confined to rural areas where they could rely on agro-pastoral activities as the mainstay of their existence. In fact, it would have proved advantageous for them to live close to or even within an urban setting, because this would have improved access to markets. The more successful fishers would probably have become fully fledged commercial fishers in time, selling or trading most of what they caught and even employing others to assist

them with harvesting and processing of their catches.

The data from this study strongly support this hypothesis. In the Southern Cape (Regions C–E) and in southern KwaZulu-Natal (Region G), the numbers of fishers found in urban settings approach, or even exceed, the numbers of their rural counterparts. Only in those areas lacking cities do rural fishers remain overwhelmingly dominant (Regions A, F and G). Intertidal harvesting remains the dominant activity among subsistence fishers only in the eastern part of the country (Regions D–G). However, even in that region it is only marginally more important than harvesting in the shallow subtidal. On the West and South coasts (Regions A–C), harvesting of nearshore resources (i.e. those that require the use of a boat) has superseded both intertidal and shallow subtidal harvesting. Similarly, although intertidal invertebrates are still important in all regions of the country, they have been surpassed in many areas by fish and by high-value species such as rock lobster, oysters and abalone. Such species are not usually consumed by the fishers themselves, but nonetheless make an important contribution to livelihood because they provide much needed cash income, which is virtually indispensable in a modern-day society. Cockcroft *et al.* (2002) discuss this issue in greater detail.

Many traditional fishers (those associated with communities that have been involved in such activities for >50 years) still exist in the eastern part of the country. They rely on agro-pastoral activities, supplementing their protein requirements by harvesting marine resources. It is likely, however, that this situation still prevails more for political reasons than anything else. During the 1960s, as part of the apartheid policy, a large portion of the black African population in South Africa was restricted to traditional “homelands” in the eastern part of the country, in areas such as the Transkei, Ciskei and KwaZulu. Resultant high population densities and the virtual absence of infrastructure and any prospects for employment in these areas meant that many people were forced to adopt, or return to, a traditional subsistence lifestyle. Tribal land tenure and widespread poverty have perpetuated this situation to a large degree. Consequently, rather than representing typical subsistence fishers, these classic “old-type” fishers are in fact somewhat of an anomaly under the present conditions, brought on by an unjust political system.

In some areas, particularly the West and South-Western coasts, diversification in resource use and the frequent sale of catches has brought subsistence fishers closer to what is traditionally considered to be the realm of commercial fishers. What was once two clearly distinct groups of fishers has now been blurred into a long continuum ranging from extremely poor

people, who personally harvest marine resources for their own use, through to wealthy businessmen who harvest, process and sell marine resources purely for profit. Many of the fishers on the lower end of the scale are clearly very vulnerable and require protection in order to survive. However, any special dispensation or even special concessions afforded to the true subsistence fishers could quite easily become a loophole for unscrupulous poachers or for opportunistic commercial or recreational fishers. Indeed, in the words of a Technical Relief Measures Task Team (van der Elst *et al.* 1996): there are a great many people calling themselves subsistence fishers, ranging from the most needy marginalized fishers to those that unscrupulously parade as subsistence fishers who in reality are nothing more than recreational or illegal commercial fishers.

One of the primary aims of this study was to identify criteria that may be useful in defining exactly what constitutes a subsistence fisher, and how they can be distinguished from their commercial and recreational counterparts. This issue is discussed at length by Branch *et al.* (2002b). It is by no means a straightforward process. Several criteria that initially seem to appear useful in distinguishing subsistence fishers from other groups are not necessarily sound. A good example of this is evident among those that were initially identified as being subsistence fishers on the West and South coasts (Regions A–E). Linefishing is an important activity in this region. It is also one of the oldest and best-established commercial fisheries in South Africa (Griffiths 2000). Commercial linefishers use a variety of boats to catch their fish, but typically these are motorized vessels that carry a crew of 2–16 men, and are capable of ranging over long distances. For most people, there is little doubt that such fishers should be classified as fully-fledged commercial fishers. From the information yielded by the interviewees, the major characteristics of the “subsistence” fishers there exhibit a remarkable level of similarity. In much of the region, but particularly in the South-Western Cape (Regions B and C; the centre of the linefish industry), most fishers operate in the sea (as opposed to estuaries), they harvest mostly nearshore from boats that are motorized, and fish makes up the bulk of their catch. When the interviewees were questioned more closely, however, it became evident that most of these “subsistence fishers” operate as crew on linefish boats, either on a full-time or part-time basis. They may also harvest marine resources from the intertidal or shallow subtidal, but use this mostly as bait to catch fish. They regularly consume part of their catch, supplementing this with intertidal species. Intertidal resources can become their main source of food when the weather is too rough to go to sea, if they are unable to secure a

crew position on a boat, or fish are seasonally unavailable. Depending on what criteria are used, or the time of the year in which the assessment is made, these fishers could be classified as either “subsistence” or “commercial”.

Similarly, many of the bigger commercial fisheries on the West Coast are highly seasonal in nature (e.g. the purse-seine and rock lobster fisheries), and provide employment for their crew for part of the year only. Alternative sources of employment along that coast are extremely limited and therefore many of these people are forced to rely on a subsistence-type existence during the off-season. In some cases this may be as much as 10 months in any one year. Using a criterion such as having an alternative source of income as a means of eliminating fishers from being considered as “subsistence” fishers, becomes questionable under these circumstances.

Aspects such as having a history of involvement in fishing may help in distinguishing *bone fide* subsistence fishers from other groups, but this could also lead to potentially unfair discrimination. For example, large industrial projects attract unskilled workers from relatively far afield to provide labour during the construction phase of the project. These projects usually take several months or even years to complete, but almost without exception once they are complete many workers are left without jobs. If the project happens to be on or near the coast, these workers while looking for alternative employment frequently turn to a subsistence-type existence to support themselves and their families.

In summary, formulating appropriate criteria with which to distinguish the *bone fide* subsistence fishers from less needy commercial and recreational fishers will be no easy task, but it has to be done. The temptation to define subsistence fishers too broadly must be resisted because the needs of the fishers will have to be balanced against limits of sustainability of the resources on which they depend. Allowing a subsistence livelihood to serve as a safety net upon which coastal residents can fall back in times of hardship may seem a reasonable approach, but this would almost certainly result in overexploitation of resources, as would any other system of open access.

This survey has shown that large numbers of coastal communities (at least 147) embark on activities that fall somewhere in the spectrum between subsistence fishing and small-scale commercial fishing. The numbers of people involved in these activities are substantial, estimated at around 28 000 in the current study. The task of formally recognizing and registering them and controlling their activities is massive, but it will need to be grounded on the surveys described here, which provide the first estimates of how many

people are involved and where they are located. Geographically, there are obvious shifts in the type of fishing that takes place. On the western and south-western coasts the numbers of people involved are relatively small, and many of them focus on resources that yield high-cash returns, particularly abalone and rock lobster. These people would benefit by being classed as small-scale commercial fishers rather than masquerading under the cloak of "subsistence". Genuine subsistence fishers do exist on the western and south-western sections of the coast, and their needs also need to be catered for. Nevertheless, efforts to develop a management system for subsistence fishers should initially be focused on the East Coast, where the bulk of subsistence harvesting is concentrated and resources are already under severe pressure (Siegfried *et al.* 1985, Dye 1992, Tomalin and Kyle 1998). The need for action in other parts of the country is less urgent and may even require alternative approaches, such as the development of artisanal or small-scale commercial operations.

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APPENDIX

**List of subsistence-fishing communities identified by the interviewees during the course of the study.
The numbers correspond to those on Figure 1**

Region A

1. Port Nolloth
2. Hondeklipbaai
3. Ebenhaeser
4. Papendorf
5. Doringbaai

Region B

6. Groothoekbaai
7. Lambert's Bay
8. Elandsbaai
9. Veldrif
10. St Helena
11. Paternoster
12. Vredenburg
13. Saldanha
14. Churchhaven
15. Hopefield
16. Yzerfontein
17. Mamre
18. Atlantis
19. Cape Town
20. Hout Bay

Region C

21. Oceanview
22. Kommetjie
23. Masiphumele
24. Retreat/Steenberg
25. Khayelitsha
26. Macassar
27. Gordon's Bay/Strand
28. Kleinmond
29. Hawston
30. Hermanus
31. Gansbaai
32. Buffeljags
33. Struisbaai
34. Arniston

Region D

35. Witsand
36. Pontjie
37. Still Bay
38. Gouritzmond
39. Vleesbaai

40. Mossel Bay
41. Hartenbos
42. Power Town
43. Groot Brak Rivier
44. Herolds Bay
45. Victoria Bay
46. Knysna
47. Hornlee
48. Kranshoek
49. Plettenberg Bay
50. Wittedrif
51. New Horizon
52. Bitou
53. The Craggs

Region E

54. Covie
55. Storms River
56. Jeffrey's Bay
57. Gamtoos River
58. Loerie
59. Seaview
60. Cape Recife
61. Port Elizabeth Harbour
62. Swartkops
63. Colchester/Sundays
64. Nankos
65. Bushmans/Klipfontein
66. Marselle
67. Kariega
68. Port Alfred/Kowie
69. Fish River
70. Bira
71. Keiskamma West
72. Keiskamma East
73. Chulumna
74. Kidd's Beach
75. Cove Rock
76. Fuller's Bay
77. East London
78. Gonubie
79. Kei Mouth

Region F

80. Qolora
81. Ncizele
82. Debese

83. Kobonqaba
84. Maxambeni
85. Mazeppa
86. Mkawukazi
87. Ngadla
88. Xazini
89. Mahasana
90. Kwa Bitsha
91. Nqabarana
92. Ntubeni
93. Mpume
94. Mendwana
95. Hobeni
96. Cwebe
97. Nkanya
98. Qatywa
99. Bulungulu
100. Mdikana
101. Zitulele
102. Coffee Bay
103. Madakeni
104. Ndungunyeni
105. Sikolweni
106. Mtentu
107. Skhombe
108. Mtolane
109. Mnyameni
110. Mpahlane
111. Mzamba
112. Nqeza

Region G

113. Thongasi
114. Thundesha
115. South Broom
116. Ramsgate/Mvunshini
117. Fairview
118. Mfazazane
119. Turnton
120. Ilfracome
121. Umgababa
122. Phoenix
123. Blackburn
124. Verulam
125. Desainger
126. Tongaat
127. Shaka's Head

128. Tinley Manor
129. Groutville

Region H

130. Glenhills/Warrenton
131. Nonoti
132. Wedebe/Tugela
133. Emphublweni
134. Mantshangule
135. Macambeni
136. Thengela
137. Matikulu
138. Port Dunford/Nymbe
139. Madlankala
140. Empebeni
141. Umhlathuze Valley
142. Umhlathuze
143. Nseleni
144. Nhlabane
145. Sokhulu
146. Nkundusi
147. KwaMduka/Nibela
148. Kosi Bay