International Hydrographic Review, Monaco, LXIX(1), March 1992

HYDROGRAPHY IN THE REPUBLIC OF SOUTH AFRICA TODAY

by the Hydrographic Office - Republic of South Africa [1]

INTRODUCTION

The seas around the coast of the Republic of South Africa were surveyed by the British Royal Navy until 1924, when the task was taken over by the Union of South Africa. Initially, surveys were carried out under the direction of the United Kingdom Hydrographic Office and all the original documents were submitted to London. A donated vessel, the sloop HMS CROZIER, renamed PROTEA, was used until she was paid off in 1933 due to the depression; the vessel was equipped with an echo sounder. The work was then continued by using a fishery research vessel for six months of the year; for the other six months, the surveyors worked in the field, preparing control, building beacons and coastlining.

All hydrographic work was stopped during World War II, but after the war, the Flower class corvette HMS ROCK ROSE was converted to a survey ship and, in 1948, was renamed PROTEA. She was replaced by NATAL, the converted HMS LOCH CREE, in 1957, which was the first South African vessel to be equipped with an electronic positioning system, the two-range Decca. She served valiantly not only surveying, but doing oceanography and serving as a supply ship to the meteorological stations in the Southern Ocean. The present SAS PROTEA was built by Yarrows in Glasgow on similar lines to the British HECLA class.

The Republic of South Africa joined the IHO in August 1951, but the independent Hydrographic Office was only established in 1955, with a staff of three - the Hydrographer, a clerk and a draughtsman. At the moment, the Office has a staff of 29. The present Hydrographer is a Captain in the South African Navy. He reports directly to the Chief of the Navy.

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SAFETY INFORMATION

The Hydrographic Office publishes monthly Notices to Mariners with radio broadcasts in between and it has the responsibility for NAVAREA VII. The Republic has not yet invested in the NAVTEX system. It would be very good to have NAVTEX on the extended coastline, which does not offer much shelter during bad weather, but creating the required infrastructure would be too expensive in the present lean times. The Office budget could also not cope with paying to transmit the same information three times - on coastal radio stations, NAVTEX and NAVAREA VII.

The Republic has not yet joined INMARSAT. This leaves another dilemma concerning the promulgation of MSI (Maritime Safety Information). The Office hopes that other departments will support the need to join INMARSAT. Fragmentation in this field complicates the issue. The Department of Transport is responsible for maritime safety and the administration of the Maritime Safety Act. The Department of Post and Telegraph, which is being prepared for privatisation at present, is responsible for communications. The RSA may have an earth station before implementation. There are however a very large number of vessels not fitted with INMARSAT receivers which will necessitate radio broadcasts for the foreseeable future.

SEARCH AND RESCUE

The problem of fragmentation also manifests itself in this field. It is being addressed at the moment and it is hoped to have the answer by the end of 1992. The problem of not having an INMARSAT earth station and some ships already not calling on radio may create a potentially dangerous situation. Three times during 1990 and in May 1991, the rescue centre at Falmouth in the United Kingdom advised the South African authorities that vessels were in distress in the local area of interest.

Work is also being done to provide interpretation of satellite imagery of marine phenomena. The Agulhas current can reach up to 6 + knots along the shelf. The flow pattern in the retroflection area is very complex (Fig. 1, 2). The only way to get near real-time information on this complex flow pattern, together with the eddies, is by remote sensing. When this programme has been completed, there will be a much improved method of forecasting drift patterns along the coast.

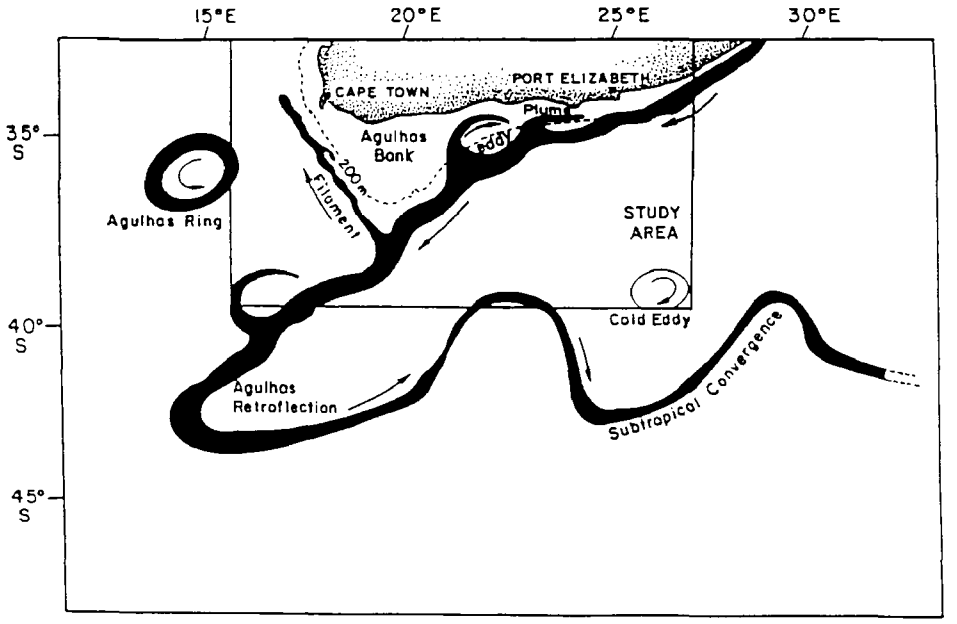

FIG. 1.- Flow pattern in the Agulhas current (A).

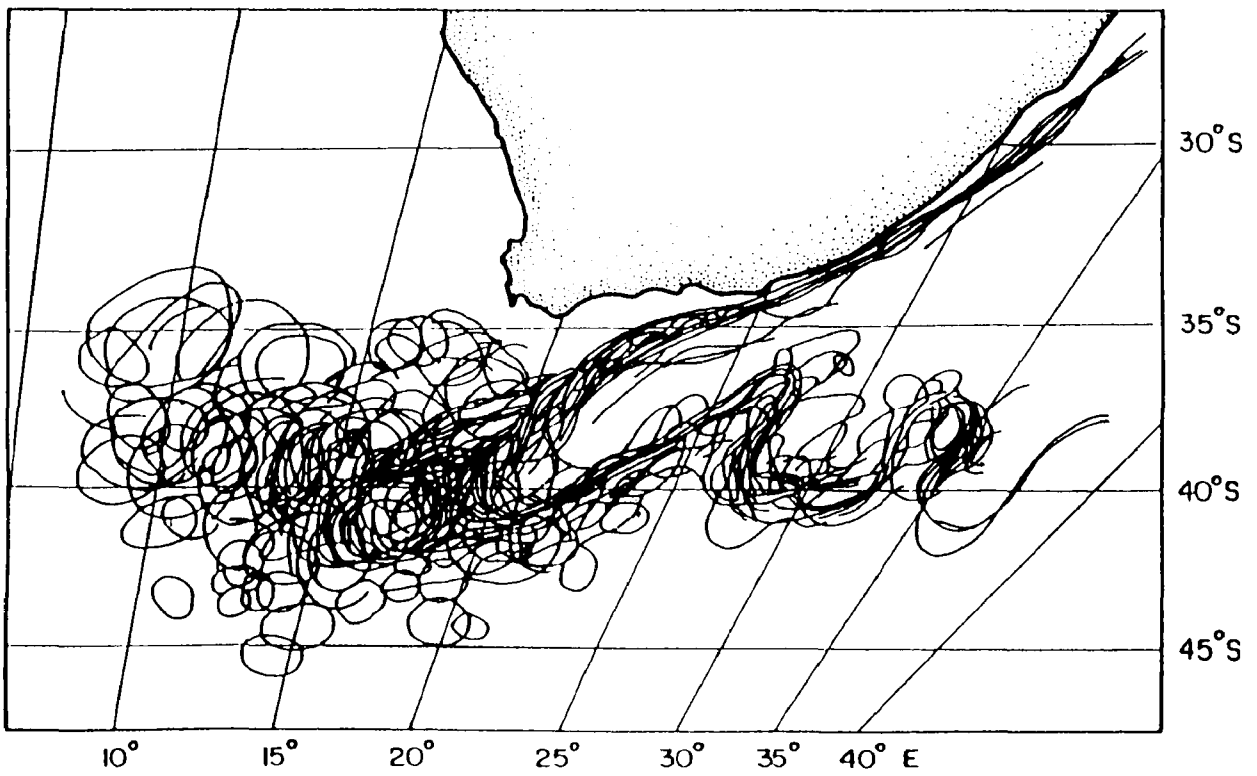

FIG. 2.- Flow pattern in the Agulhas current (B).

CHART SERIES

The Hydrographic Office produces 180 charts, including those of the coast of Namibia. It also produces Sailing Directions, a catalogue, List of Lights and Radio Signals, Tide Tables, etc. A start has been made on producing a 1/300 000 series of charts which will replace the 1/150 000 series from the Kunene River (chart 71) to Cape Columbine (chart 78) on the west coast and again from Cape Agulhas (chart 81) along the south coast to Cape Recife (chart 82) (Fig. 3). The 1/150 000 series will be retained around the south western Cape and along the east coast, where vessels of necessity hug the coast to keep out of the Agulhas current.

The Office supplies ± 1 200 charts a month, of which about 30% goes to the Navy. To accommodate the needs of pleasure craft, a unique 1/200 000 chart series is being produced; this covers conveniently the areas that can be reached over a week-end by small craft, on a size 700 x 500 mm, the average size of their chart tables. On the back of each chart is printed an extract of the Sailing Directions as an aide memoir, plans of the harbours in the area, a matrix with facilities to be expected in each harbour, together with a table of the radio beacons in the area.

With the closure of the Decca Navigator chains in South Africa in sight and the implementation of GPS, the deep sea trawlers find themselves with a problem. The track plotter gave position relative to the configuration of the Decca Chain with no geographical reference. The plotting sheets brought the relative and (absolute) geographical position together (There is of course no doubt that GPS is more accurate). As a measure of safety, the Office did not print the Decca overlay on the small scale charts and far from the coast, due to the inherent inaccuracies of the system as installed in the country. The problem was solved by producing plotting sheets on 1/150 000, with a Decca overlay for the various fishing grounds. (Fig. 4).

TIDES

Since 1957, the Hydrographic Office has been measuring the tides along the coast on a continuous basis with the appropriate analyses and record keeping. This was originally done by the British and the then South African Railways and Harbours. The British records are not available and the Railways and Harbour's tide gauges were neither levelled-in nor calibrated. For a number of gauges, information for more than 18.6 years is available, and one port has more than 30 years data.

The gauges previously in use could only be read in centimetres. However, with the alarm raised by the greenhouse lobby it became necessary to measure the water level to millimetre accuracies. To achieve this accuracy, air pressure and water temperature becomes important. The Office has installed six acoustic tide gauges to achieve this. They are of a local design and manufacture. They have proved to be extremely reliable during their two years of operation. They are interrogated via a

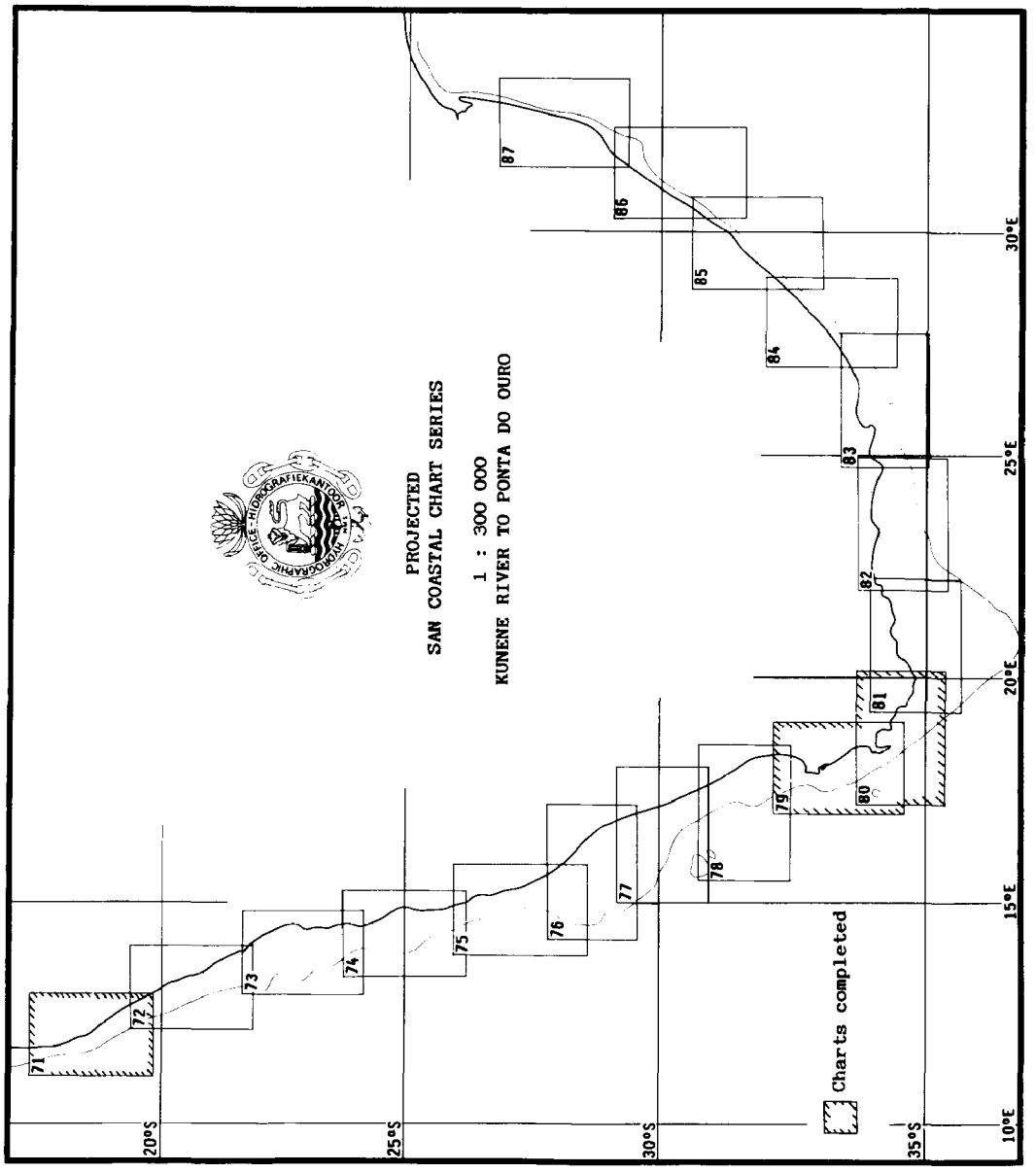

FIG. 3.- Projected SAN control chart series - 1:300 000 - Kunene River to Ponta do Ouro (C).

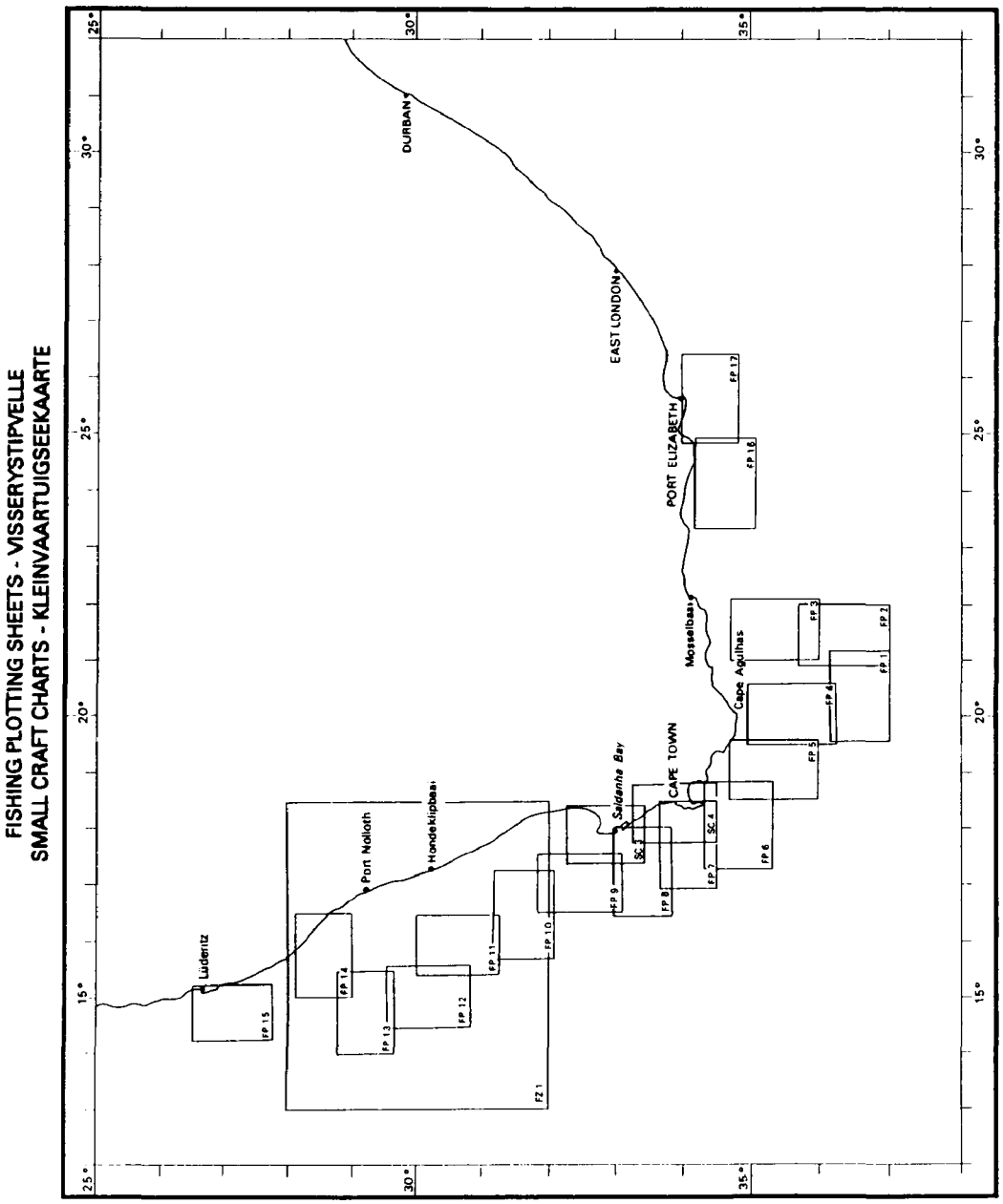

FIG. 4.- Fishing Plotting Sheets (D).

modem by telephone from the Office and they may be read every minute and, depending on the requirements, will supply 10 minutes or hourly means.

None of the stations around the coast were sensitive enough to indicate a rise in sea level reliably. An exception is Port Nolloth on the west coast, which indicates a rise of 0.37 cm per decade (Fig. 5). All the old mechanical gauges will be replaced in due course by automatic ones.

TRAINING

Because the numbers are limited to about one officer per year, it has not been economical to implement a hydrographic course in the country. Instead, hydrographic surveyors are trained as normal naval officers with a view to specializing in hydrography. They are then given hydrographic training in-house and on the job. After six years, they have been trained to a high enough standard to attempt the post-graduate course at the Polytechnic in Plymouth, United Kingdom. This is a requirement for command of a survey vessel or being in charge of surveys.

Cartographers are trained at the Cape Town Technikon in a three-year diploma course in mapping. Some of the relevant lectures are given by Hydrographic Office staff. After this course, they are given practical training in the Office for another year before they are let loose on their own. With the advent of computer-assisted cartography, the curriculum is under review to include more computer science to replace some of the practical skills.

The one area of training that has been neglected over the last decade is that of the survey recorder or technician. The problem is presently under review to find a way to rectify it. Again, the low number of students make the setting-up of a course impractical.

SHIPS

Owing to a lack of numbers to man vessels, the Office has lost the small vessel used for surveying the approaches to harbours. It is foreseen that within five years the branch will be rebuilt to sufficient strength to man another vessel.

The only ship operated by the Office at the moment is SAS PROTEA, which was built by Yarrows, in Glasgow, along similar lines to the HECLA class of the British Navy and commissioned in 1972. The major differences being in the engine room, propulsion, hangar, flightdeck and bridge. The data capturing and processing system on board was renewed during a refit in the first half of 1991. The computers are of local manufacture, driven by software developed by Oceanics in the UK, according to local specifications. The chartroom and bridge stations are interoperable and linked by fibre optic cable.

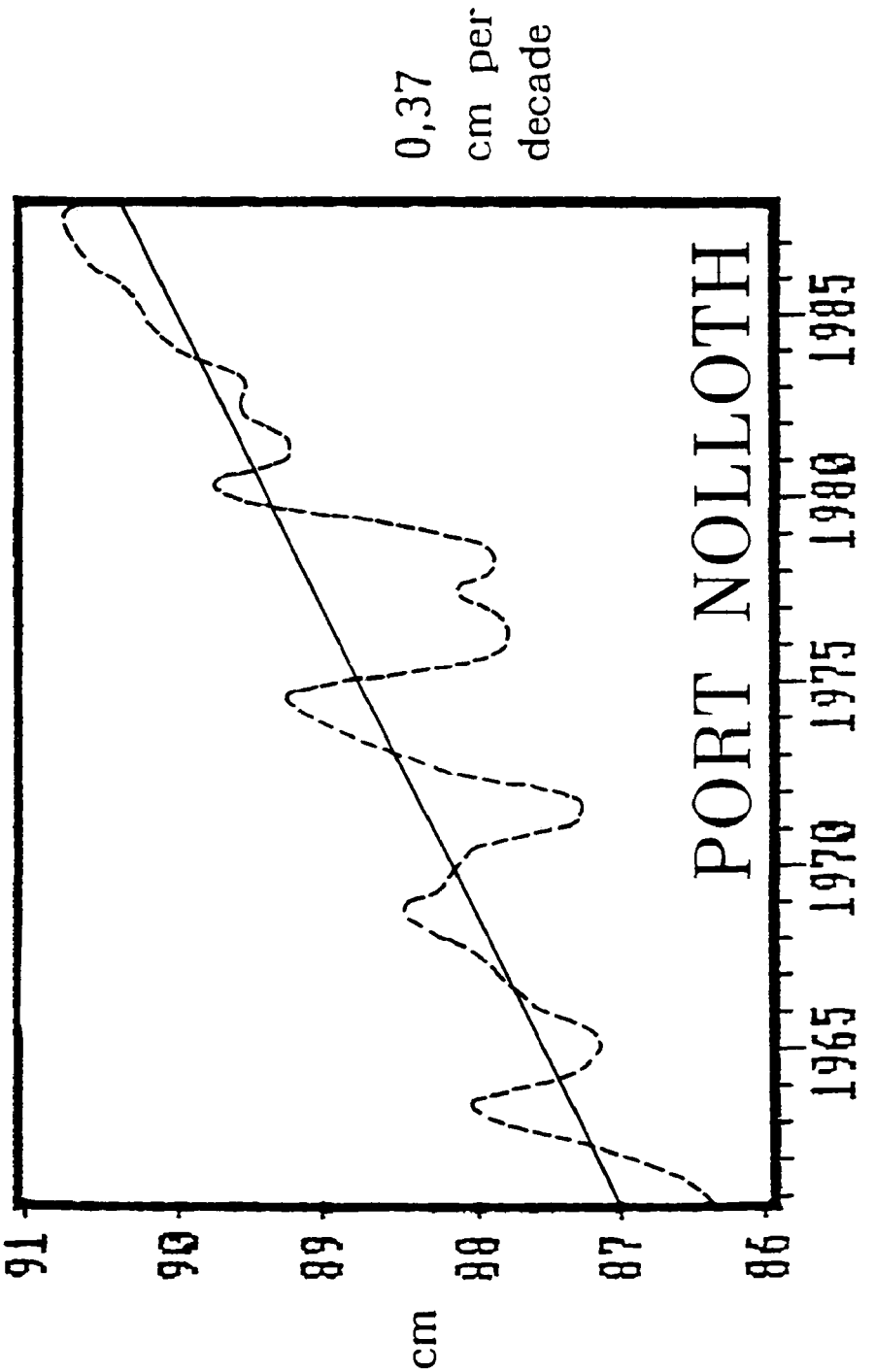

FIG. 5.- Sea level trends in Port Nolloth (E).

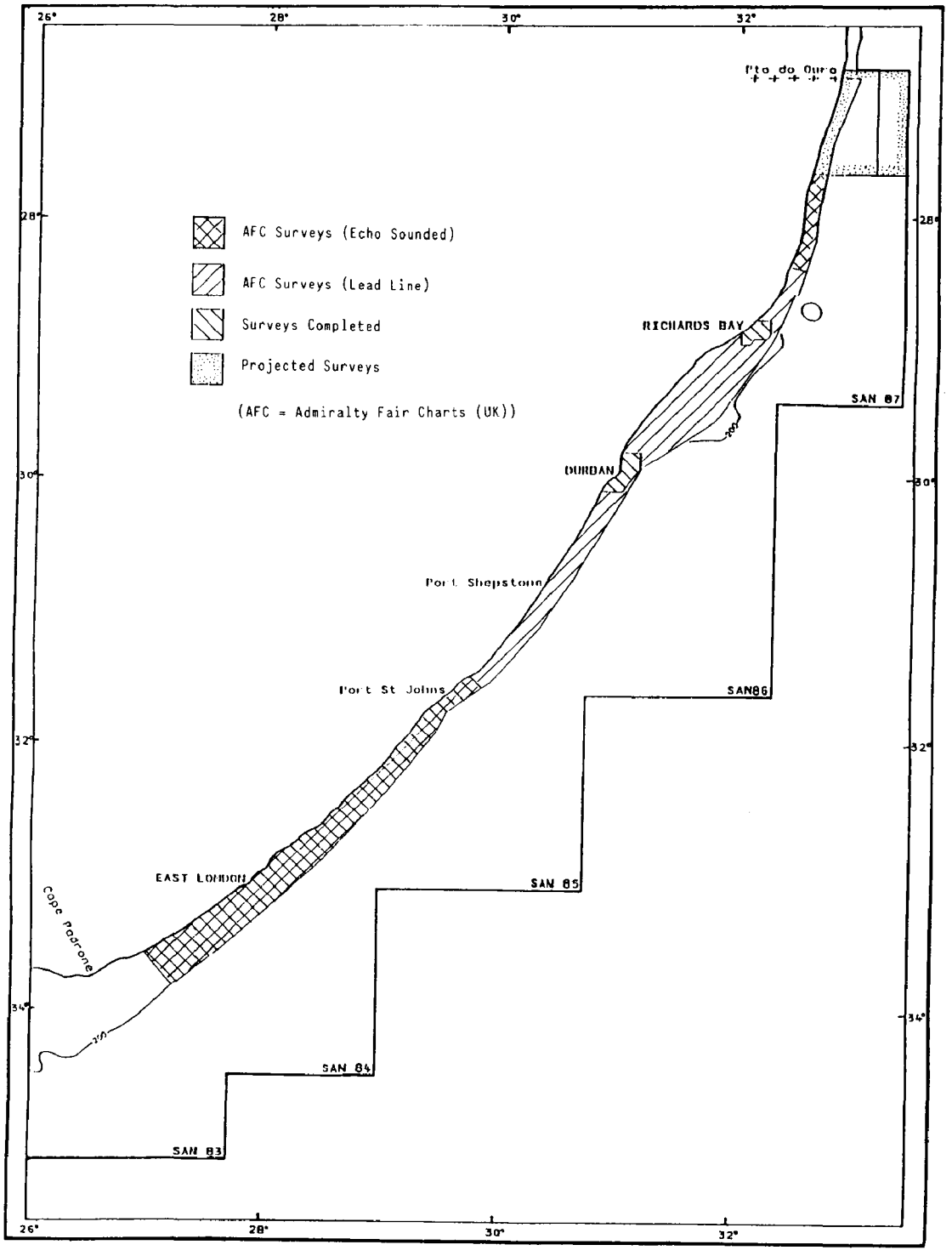

FIG. 6.- Surveys carried out and projected (East Coast) (F).

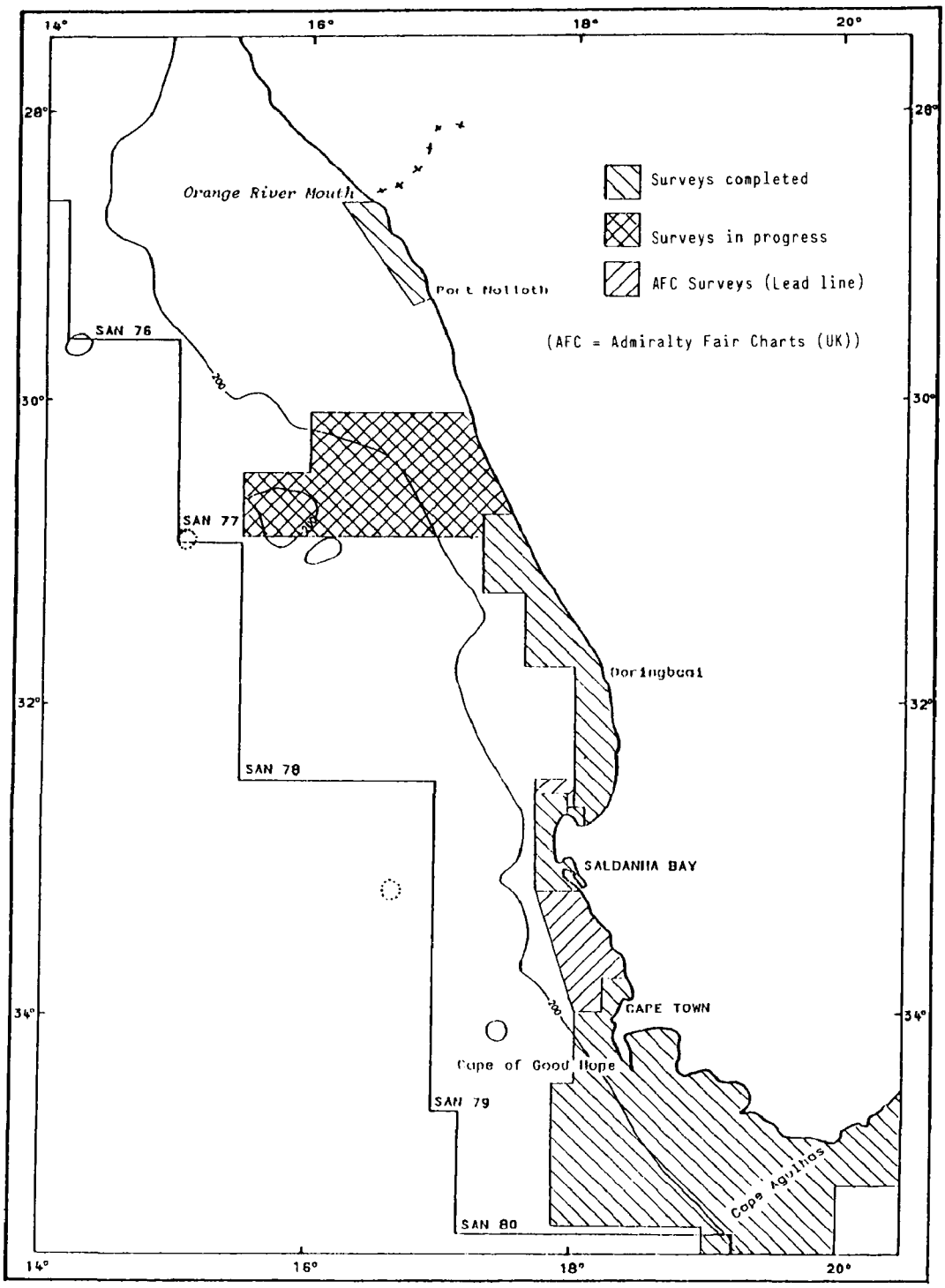

FIG. 7.- Surveys completed and inprogress (West coast) (G).

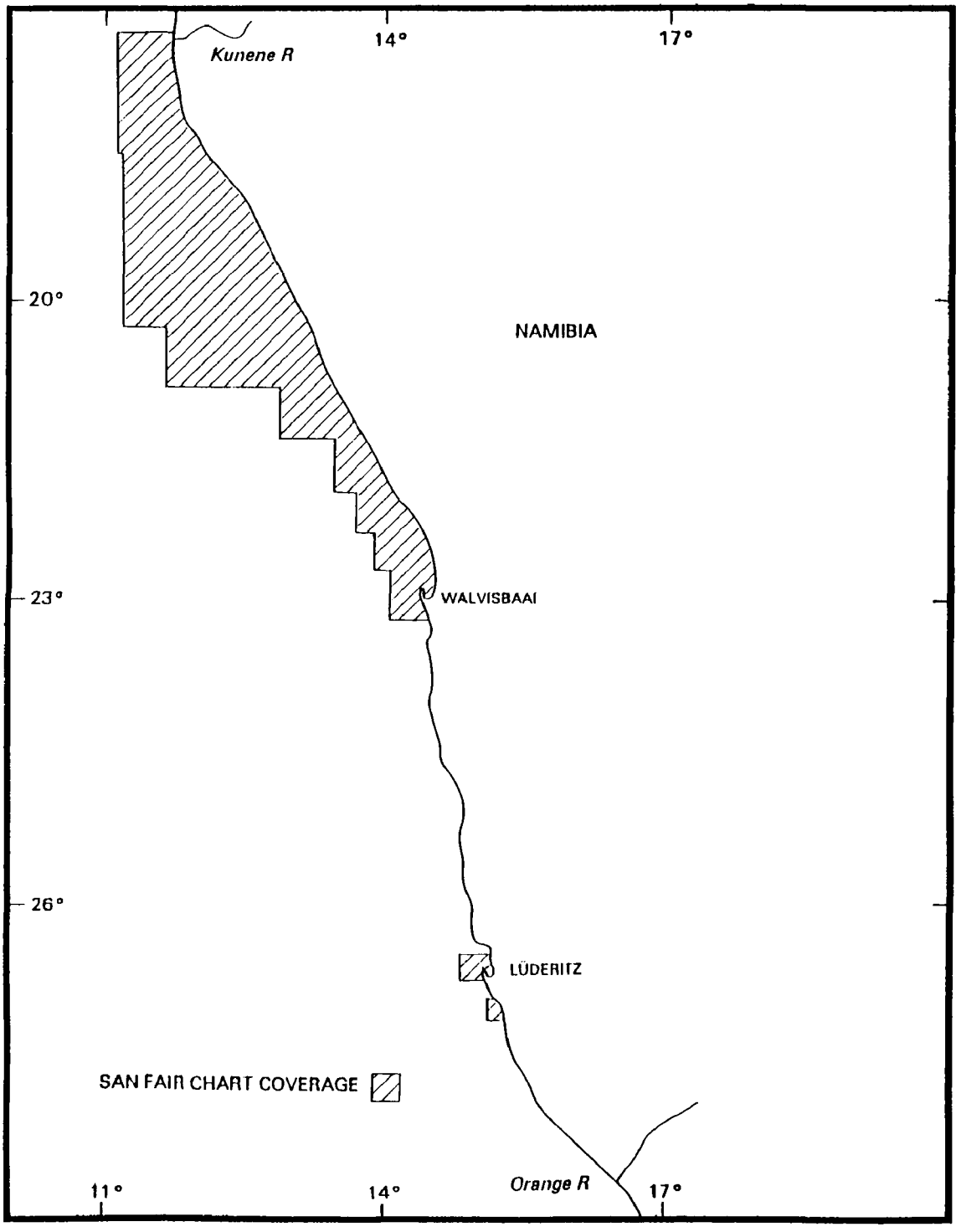

FIG. 8.- Surveys completed on the Namibian coast (H).

The inshore positional control will be by refurbished Trisponders; offshore control will be by a newly acquired Hyperfix chain, with a HYLINK differential GPS option. At the same time, three new launches have been built with a scaled-down, data capturing system. Two of the launches are carried on board the ship and the third is on a trailer for deployment by road. The multi-beam echo sounder has been ordered late in 1991 and will be fitted at the next refit in 1993.

PROGRESS

Surveying progress to cover the extensive area with only one ship has been slow. The south coast has been well surveyed by echo sounder. The east coast has been partially surveyed by echo sounder (Fig. 6).

The gap on the west coast is being closed slowly and should be filled by the end of 1993 (Fig. 7). Although the distance offshore was reduced to cover only the territorial sea, the Namibian coast could only be covered down to Walvis Bay before its independence (Fig. 8). It is a pity that the section between Luderitz and the Orange River could not be done as this is one section where a large amount of diamonds are recovered from the sea annually and the Office has had many requests for data in the area.

CONCLUSION

Hydrography has come a long way in the Republic of South Africa since the first organised steps in 1924. Liaison with the neighbouring countries on maritime safety information has begun. Despite language barriers, training has been offered, as well as assistance. The major problems these days are no longer beam compasses and straight edges, but the backing up of information and keeping the library of computer programmes up to date. Exciting times lie ahead when the Fair Chart becomes only a legal document and information is transferred electronically from the ship to the Office.