CRC REEF RESEARCH TECHNICAL REPORT

AN ATLAS OF TROPICAL CYCLONES IN THE GREAT BARRIER REEF REGION, 1969-1997

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FOREWORD

Cyclones are among the most important natural agents of disturbance on coral reefs in non-equatorial regions. The severity, extent and frequency of cyclonic damage on the Great Barrier reef is such that almost all reefs have been impacted by cyclones at least once in the last 20 years. Both direct effects such as cyclone generated waves, and indirect effects such as turbid, sediment laden river plumes can substantially alter the physical structure and community composition of reefs. These disturbances create a complex pattern of reef status within the GBR, with different reefs being at various stages of recovery from cyclonic damage. From a management viewpoint, it is important to understand not only the statistical probability of natural damage to reefs in different parts of the GBR, but also to be able to determine which reefs have experienced specific frequencies of cyclonic disturbances in the past, and how long it has been since the last disturbance. This atlas provides just this type of information, and a great deal more, through a comprehensive series of maps and tables. It will be of considerable use to managers wishing to determine the likely status of a particular reef and its vulnerability to further anthropogenic stress.

The production of this atlas came about as a result of a personal request during a CRC annual review of a project to develop detailed predictive models of cyclone damage. This responsiveness on the part of the researcher to the immediate needs of managers is an excellent example of the advantages of the close cooperative relationship which has developed between certain managers and researchers within the Cooperative Research Centre. As an interim product of this CRC project, this atlas will be frequently referred to, both by managers and, I suspect, many researchers.

Jamie Oliver
Monitoring Coordinator
Great Barrier Reef Marine Park Authority

1. SUMMARY

Tropical cyclones generate high winds, large waves and often massive rainfall that can cause major damage to the coral reefs of the Great Barrier Reef Region (GBRR). Damage to reefs from several recent cyclones has been documented: Winifred (1986); Ivor (1990); Joy (1990); Sadie (1993); Celeste (1996); and Justin (1997). Observed cyclone damage ranged from minor breakage of fragile branching corals to major losses of coral coverage over entire reefs.

This atlas provides a first step towards understanding the risk of cyclone damage to coral reefs and other associated ecosystems of the GBRR by facilitating an examination of the history (climatology) of cyclones across the region over time.

Through an extensive set of maps and charts and relevant background information, this document provides: 1) a compilation of the paths and basic characteristics of tropical cyclones through the GBRR from 1969 to 1997 and 2) an exploration of the spatial and temporal patterns of cyclone activity across the region. As a reference document, this atlas can be used to address a wide range of questions such as:

- What is the history of cyclone activity near a particular location (a reef, a pontoon, an island resort, a port)?
- Was a cyclone nearby at a particular time (could a cyclone have contributed to an observed pattern of damage on a reef, a seagrass bed)?
- Which areas of the GBRR have had the most frequent or the most intense cyclones?

2. ABOUT THIS ATLAS

The purpose of this atlas is 1) to provide a compilation of the paths and basic characteristics of tropical cyclones through the Great Barrier Reef (GBR) Region from 1969 to 1997 (Map 1) and 2) explore spatial and temporal patterns (eg, are cyclones more frequent in certain parts of the GBR?). This is a response to requests for information about cyclones in the GBR such as, "*What cyclones* have passed through the GBR over the last 20 years or have passed near Green Island since 1969?" , "*What was the intensity* of Cyclone Charlie at its closest approach to John Brewer Reef?", or "*How many cyclones* have passed near Rocky Island, and during what months of the year?". This document provides enough information to answer these types of questions by providing an extensive set of maps and charts as well as background information about tropical cyclones, how they can impact coral reefs and the spatial and temporal distributions of these impacts.

2.1 MAPS

The irregularly shaped GBR covers over 340,000 km^2, with individual reefs ranging from 10s of metres to 100s of kilometres in length. Thus, representing cyclone paths over the entire Region and the outlines of the reefs poses quite a challenge. We therefore divided the region into a series of 62 1^0 latitude by 1^0 longitude boxes, beginning with 10^0S and 142^0E and extending to 25^0S and 154^0E (Map 2). The outlines of the boxes are included on all 129 maps (except Map 1), of which there are four types:

- **Introductory:** an overview of cyclone paths through Queensland waters from 1969-1997 and the map index,
- **Overview of Trends by Box:** the number of cyclones, the length of cyclone paths and the years since the last cyclone per box by cyclone category and by month, the minimum central pressures recorded by month per box, and the recorded directions of cyclone forward motion by month per box from 1969-1997,
- **Yearly Overview:** all the cyclones passing near the GBR Region (within 100 km) separately for each year 1969-1997, and
- **Cyclone Events by Box:** every cyclone from 1969 to 1997 passing through each 2^0 of longitude and 1^0 of latitude (each two boxes).

Map 2 (page 27 and back cover fold out) provides a visual index of each 1^0 latitude by 1^0 longitude box, to which every map in this atlas is referenced (note: all maps are in the Albers projection). In addition, an Index of Maps (page vi) lists the types and organisation of maps available. With each map is included a brief description and, if appropriate, a graph, chart, or table depicting the underlying data (for example see Map 4). Further, reef names and unique

identifying codes are listed 1) by 1^0 box (Appendix A) and 2) in alphabetical order (Appendix B). Note that some reefs may 1) fall within more than one box and 2) have the same name. Finally, all named cyclones that passed within 100 km of the GBR region from 1969-1997 are listed by year in Appendix C and by month in Appendix D.

2.2 NOTES ON MAPS AND CHARTS

- **Overview of Trends by Box:** These maps represent trends across the GBR region over the entire time period from 1969 to 1997. Although cyclone data is available from the Bureau of Meteorology from the late 1800's, data prior to 1969 (when satellite tracking of cyclones became widespread) is of dubious quality (Holland 1981) and was not used in this analysis.

  By category. These maps show 1) all cyclone paths and areas within 100 km of at least one path separately by category (eg, Map 3) and 2) the number, length, and number of years since the last cyclone path through the GBR by 1^0 latitude by 1^0 longitude box (eg, Maps 4, 5, 6). Cyclones located within 100 km of the GBR were determined to be "near" the region as field studies have reported impact to reefs from cyclones located as far away as 100 to 200 km (Done 1992b, Connell et al in press). A cyclone's properties, such as central pressure, category ranking, speed of forward motion and direction, constantly change over the length of the path (See *Introduction to Tropical Cyclones* for an explanation of the basic characteristics of tropical cyclones and Table 2, page 21). To account for this, each cyclone's path was split into segments according to category value estimates made at six-hourly, three-hourly, or one-hourly intervals (spacing of observations by the Bureau of Meteorology depends on the proximity of the cyclone to the coast and its intensity). We assume that cyclones remain the same category between estimates. Note also that no maps are provided for Category 5 cyclones because no such cyclones passed through the GBR Region or even Queensland waters in the period 1969-1997. To get an idea of the frequency and duration of cyclones across the GBR, we calculated the 1) number of cyclones (frequency), 2) total length of cyclone paths (duration) and 3) years since the last cyclone (from 1997) per 1^0 latitude by 1^0 longitude box. Due to their often erratic paths, individual cyclones may pass through a box more than once though this was rare (eg, Kerry 1978-79, Map 109). In calculating the frequency of cyclones per box, we counted each cyclone only once. However, the total length of cyclone paths per box

includes the entire path of each cyclone. Charts are provided of these trends by latitude and by 1^0 latitude by 1^0 longitude box.

- By month. These maps show 1) all cyclone paths and areas within 100 km of at least one path separately by month (eg, Map 35) and 2) the number and length of cyclone paths through the GBR by 1^0 latitude by 1^0 longitude box by month (eg, Maps 36, 37). Because cyclones may span more than one month, each cyclone's path was split into segments according to month. Thus a single cyclone may count as being present during more than one month. Charts are provided of these trends by latitude and 1^0 latitude by 1^0 longitude box.
- Central pressure. These maps show the minimum central pressure recorded for all cyclones in the GBR region by 1^0 latitude by 1^0 longitude box by month (eg, Map 53). Note that cyclone pressure is recorded at six, three or one hourly intervals even though cyclones are constantly changing. Thus, it is possible that central pressures lower than those recorded may have occurred. Charts are provided of these trends by latitude and 1^0 latitude by 1^0 longitude box.
- Direction of forward motion. These maps show the direction of forward motion of cyclones at recorded eye positions in the GBR region by month (eg, Map 60). Each arrow points in the major direction of forward motion (N, NE, E, SE, S, SW, W, NW, N). Cyclone direction could change considerably along a path through a 1^0 latitude by 1^0 longitude box. Thus, average values would have little practical meaning and were not calculated by box (eg., a mean direction of south for a box might represent one cyclone moving west and one moving east!). Note also that while cyclone direction between two positions can be inferred by examining the cyclone's entire path, cyclones may move erratically between recorded positions (Holland and Lander 1993).

- **Yearly Overview:** These maps show cyclone paths within Queensland waters separately by year (eg, Map 67). The cyclone season ranges from November of one year to May of the next. Thus, the December 1974 cyclones are shown on the 1975 map, while the December 1975 cyclones are shown on the 1976 map and so on. Each yearly overview map includes 1) a pie chart depicting the percentage of cyclones passing within Queensland waters that track in the vicinity of the GBR and 2) a graph of the Southern Oscillation Index (SOI) by month and averaged over the year.

- **Cyclone Events by Box:** These maps show all cyclone paths 1969-1997 and reefs within every two adjacent 1^0 latitude by 1^0 longitude boxes (eg, Map 96). Each map includes a table that lists for each cyclone on the map: 1) name 2) date (day, month, year), 3) maximum category, and 4) minimum central pressure. These values correspond to the cyclone eye position(s) in the cyclone database located within or nearest to the two boxes. Each cyclone path on the map is labelled with the year and a label number which matches the data in the table. Note that the locations of cyclones when they are too weak to be classified a cyclone (as they form and dissipate) are not recorded by the Bureau of Meteorology. Thus, some cyclones appear to have paths that start or end "out of nowhere" on the map.

3. TROPICAL CYCLONES AND THE GREAT BARRIER REEF REGION

3.1 POTENTIAL CYCLONE IMPACTS ON CORAL REEFS

The high winds and subsequent large waves generated by tropical cyclones have the potential to impact a range of Great Barrier Reef ecosystems, particularly those associated with coral reefs. Impacts to coral reefs from cyclone-generated forces, though often extending over 100s of kilometres, are typically patchy at both regional and local scales because 1) cyclone winds and waves are typically stronger on one side of the path, 2) wave energy dissipates as waves break along reefs, creating within and between reef shelter, and 3) individual coral vulnerability to impact varies considerably over small areas (10s of metres).

Types of Impact. Coral reefs sustain both direct and indirect structural damage from breaking waves and wave-borne debris (Done et al. 1991), as well as damage from exposure to fresh water plumes that may accompany a cyclone (DeVantier et al 1997, Brodie et al 1995). Following Cyclone Ivor, Done et al. (1991) found both 1) direct physical damage: damage to the reef matrix (Figure 1), dislodgment of massive coral heads (Figure 2), stripping of soft corals (Figure 3), and breakage of hard coral (Figure 4), and 2) indirect damage from burial by sediments stirred up during the cyclone (Figure 5). Connell et al. (in press) describe changes to the reef flat structure which had a long term impact on reef recovery and survival by changing patterns of water circulation.

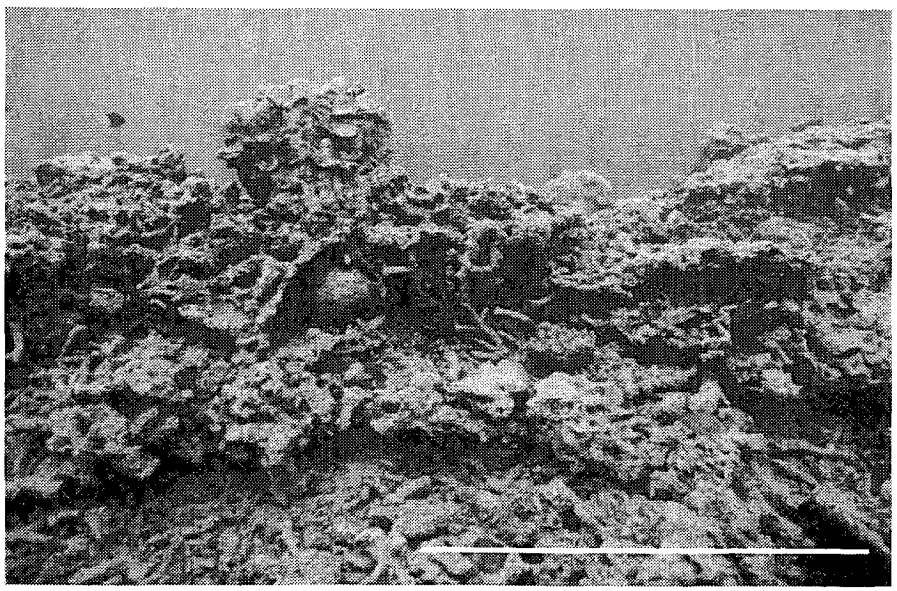

Figure 1: *Damage to reef matrix during Cyclone Ivor, 1990. The white bar equals ~50 cm. Photograph by Dr. Terry Done.*

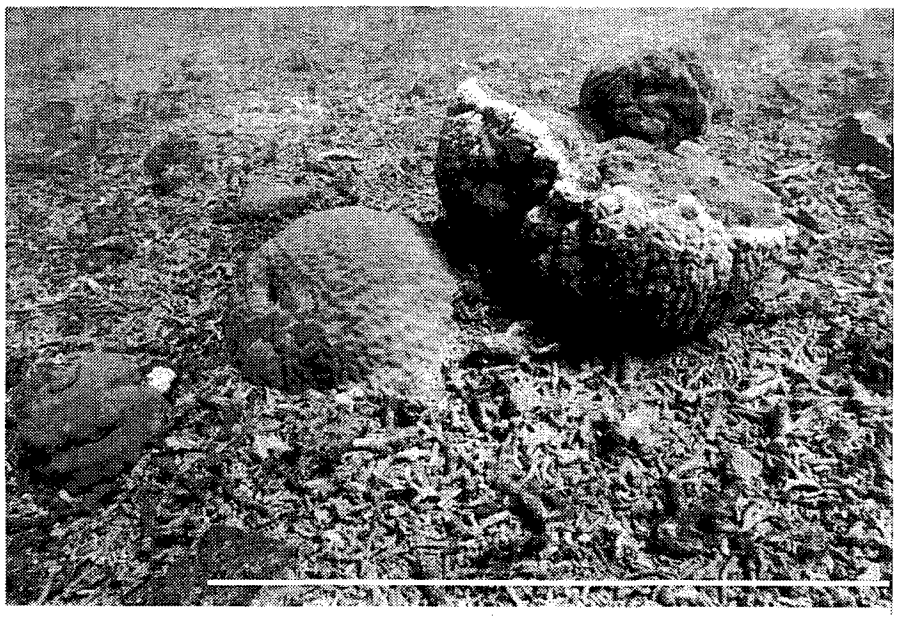

Figure 2: *Dislodgment , breakage, and burial of massive coral heads during Cyclone Ivor, 1990. The white bar equals ~1 metre. Photograph by Dr. Terry Done.*

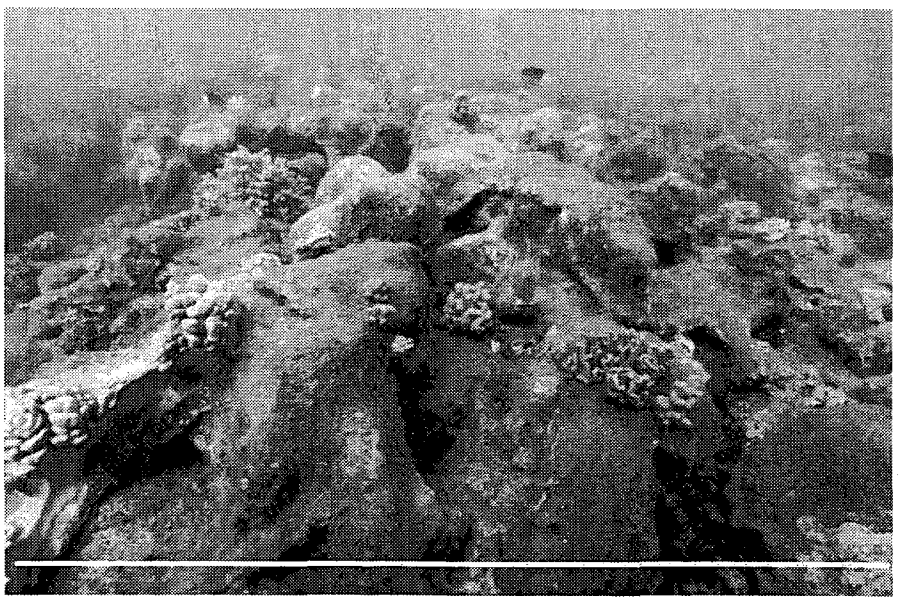

Figure 3: *Stripping of soft corals from the reef framework during Cyclone Ivor, 1990. The white bar equals ~ 1 metre. Photograph by Dr. Terry Done.*

Figure 4: *Breakage of a large plate coral during Cyclone Ivor, 1990. The white bar equals ~ 2.5 metres. Photograph by Dr. Terry Done.*

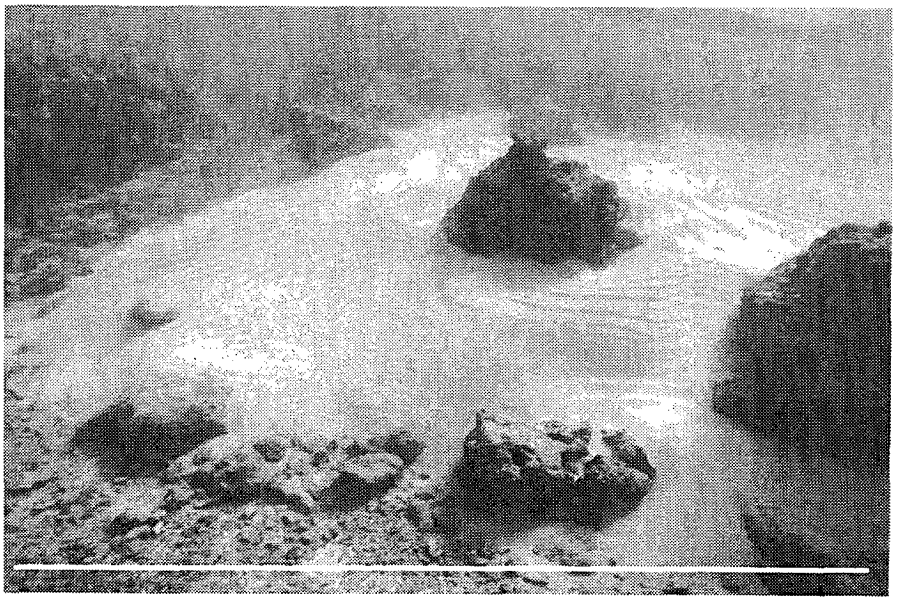

Figure 5: *Burial of coral by deposition of sediment resuspended during Cyclone Ivor, 1990. The white bar equals ~4 metres. Photograph by Dr. Terry Done.*

Spatial Characteristics of Impact. Although a single cyclone can impact many reefs in a matter of days, the distribution of impact is typically highly variable or "patchy" at a range of

spatial scales, including between reef complexes (~100s km), between reefs (~10s km), between reef sites (~1 km), and within reef sites (~0.1 km), for the reasons below:

- BETWEEN REEF COMPLEXES. Cyclone wind and wave fields are stronger to the left of the cyclone's path in the Southern hemisphere. Thus reefs located on different sides of the cyclone nominal path may experience different levels of wave energy (Figure 6).

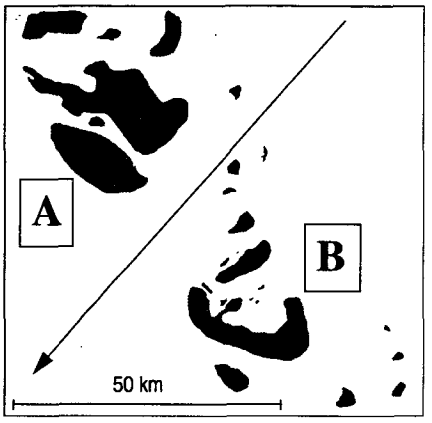

Figure 6: *Hypothetical example of the between reef complexes shelter effect. A cyclone moving in the direction of the arrow generates stronger waves to the left of its path. Less wave energy will reach site [A] than site [B].*

For example, Done et al. (1991) found reef damage from Cyclone Ivor gradually decreased out to 100 km to the left of the cyclone's path and to 30 km to the right.

- BETWEEN REEFS. A significant portion of wave energy is dissipated during breaking at the reef front (Massel 1995). Thus, the positions of reefs with respect to each other and the incoming waves can create a definite "between reef" shelter effect, where one reef "blocks" the others from the bulk of incoming wave energy (Figure 7).

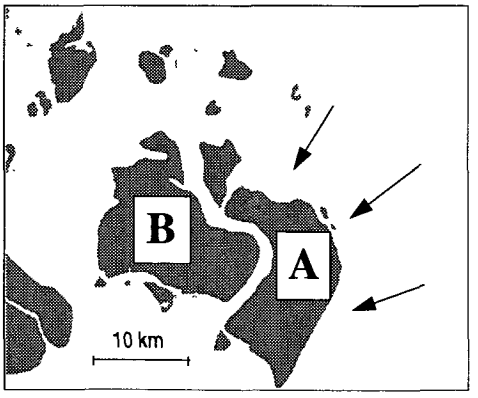

Figure 7: *Hypothetical example of "between reef" shelter effects. Waves approaching the reef matrix (arrows) break at site [A] and expend most of their energy, resulting in sheltered conditions at site [B].*

- BETWEEN REEF SITES. Depending on the size, shape, depth, slope, length relative to wave height and orientation of a reef with respect to incoming waves, wave energy is dissipated and diffracted around reefs (Massel 1995, Denny 1988), often with dramatic differences in levels of impact between the exposed and lee sides of the reef.

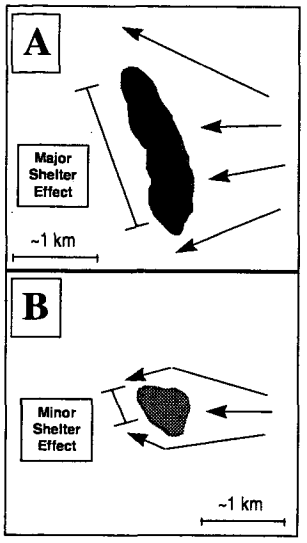

Figure 8: *Hypothetical example of the between reef sites shelter effect. Waves (arrows) dissipate and reflect from [A] creating major shelter, but bend easily around [B] creating only minor shelter.*

- WITHIN REEF SITES. The vulnerability of an individual coral to physical damage from cyclone waves depends on a great many factors that are highly variable over small distances (several metres). Thus, cyclone damage across one small area of a reef may range in severity from complete devastation to none. Factors that determine coral vulnerability to cyclone damage include, but are not limited to:
    - the strength of coral attachment to the substratum
    - the nature of the substratum (loose rubble vs consolidated limestone)
    - the coral growth forms present (fragile branching corals vs encrusting or massive heads),
    - the community size structure, as medium-sized corals are more vulnerable to wave dislodgment than their smaller or larger counterparts (Massel and Done 1993), and
    - the ambient wave conditions at the site (sheltered vs exposed).

Temporal Characteristics of Impact. Although a small percentage of the GBR Region's ~3,000 reefs are impacted by cyclones in any given year, over time virtually every reef is likely

to have been affected by at least one cyclone. We found that every location within the GBR Region has been relatively close (within 100 km) to at least one cyclone from 1969 to 1997 (Map 3). In fact, the maximum distance of *any* reef in the GBR to the nearest cyclone from 1969 to 1997 was just over 50 km (Figure 9). For most reefs, the nearest cyclone was a maximum of about 20 to 30 km away. Since physical damage has been documented at reefs

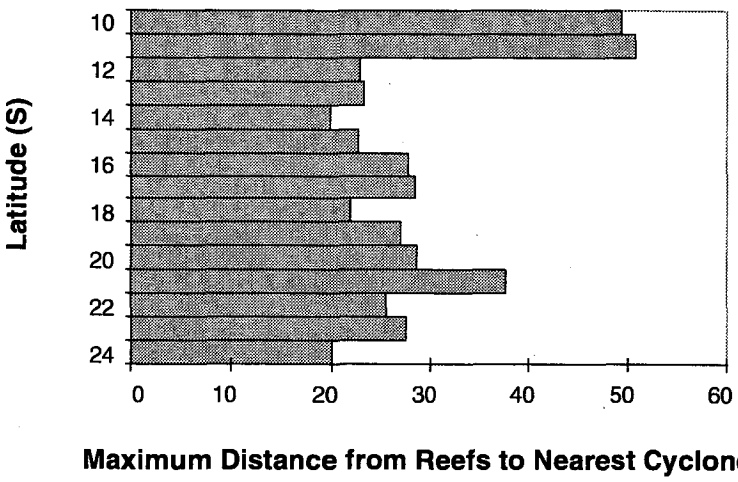

Figure 9: *Maximum distance of reefs to the nearest cyclone from 1969 to 1997 in the GBR by latitude.*

from cyclones as far away as 100 km (Done 1991) and 200 km (Connell et al in press), this suggests the possibility of widespread low level cyclone impact across the Region over the last 28 years (see Done et al 1991). In addition, many reefs have been affected by fresh water plumes extending over the GBR lagoon due to cyclone floods, such as those following Cyclone Sadie in 1993 (DeVantier et al 1997). The patterns of impact created by cyclones across the GBR region over time depends largely on: 1) the frequency of cyclones of various intensities (return times), and 2) the history of disturbance of each reef site.

Return Times. As a "pulse" disturbance, cyclone waves impact reefs within a very short time period, and repeat at time scales ranging from years to decades, depending on their intensity. The frequency of cyclones in a particular area can be measured by predicting the number of years likely to pass between successive cyclones (return time). Our results suggest that cyclones generally occur most frequently between 12^0S and 20^0S (Map 4) and that the most intense cyclones (categories four and five) are relatively rare in the GBR region (Map 32). Massel and Done (1993) found that as cyclones become more intense, they have longer return times in the GBR region (Figure 10). In addition, they found that the most intense cyclones return most frequently between about 19^0S and 22^0S.

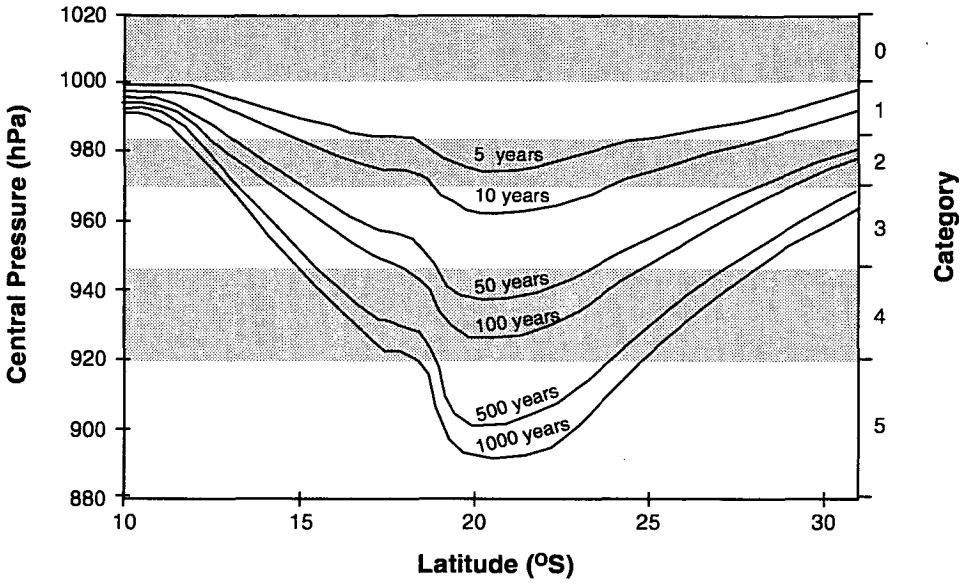

Figure 10: *Plot of expected return interval (T) for cyclones of indicated central pressures and categories at latitudes 10-20°S on the east coast of Australia. Adapted from Massel and Done 1993.*

Importance of History. The impact of a particular cyclone on a given reef site often depends just as much on the history of previous cyclones as on the characteristics of the cyclone itself (Karlson and Hurd 1993, Done 1992a & b, Hughes 1989). Individual corals on reefs become more vulnerable to storm waves as they grow larger in size (Figure 11). Thus, corals at reef

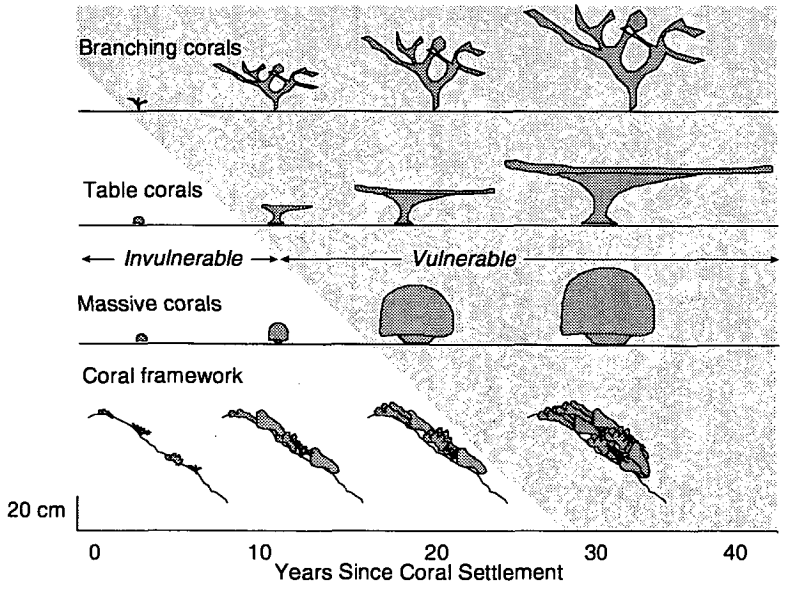

Figure 11: *Diagram showing postulated differences in time to vulnerability to storm waves of different coral growth forms and structures, assuming area was denuded in 1950. Adapted from Done 1992b.*

sites recently damaged by cyclones (less time to grow) may be less vulnerable to further damage. At some reef sites, massive corals (eg, *Porites sp.*) may remain undisturbed so long

that they reach a size that is essentially invulnerable to normal cyclone-generated waves (Massel and Done 1993, Done 1992b). In this way, in the long term (decades to centuries), intermediate levels of cyclone impact may actually enhance coral reef diversity (Connell 1978, Hughes 1989) by opening up space for colonization for a range of species.

To get an idea of how long GBR reefs have been undisturbed by cyclones, we calculated the number of years since the last cyclone passed through the GBR post 1969. Weak cyclones have visited the region more recently than strong cyclones (Figure 12), with the most recent

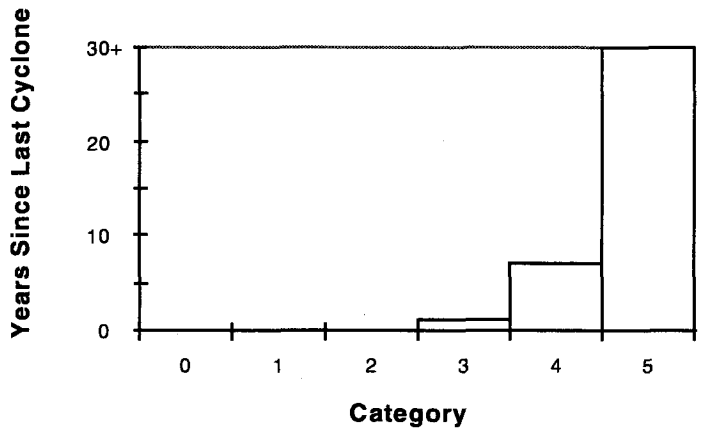

Figure 12: *Years before 1997 since the last cyclone by category has passed near the GBR region.*

weak cyclones (Gillian, Ita, and Justin) passing through the GBR this season (1996-1997). The most recent strong cyclones (Figure 13) in the GBR passed between Lizard Island and

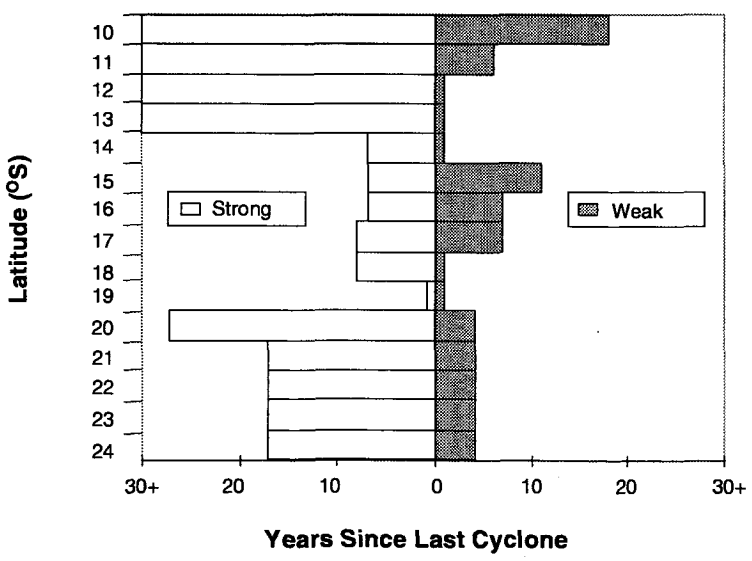

Figure 13: *Years since the last weak and strong cyclones have passed near the GBR by latitude (from 1997).*

Townsville (14^{O}S and 20^{O}S), with no strong cyclones recorded in the far north (10^{O}S to 13^{O}S) from 1969 to 1997. In contrast, the most recent weak cyclones passed through the north (12^{O}S to 14^{O}S) and near Townsville (18^{O}S to 19^{O}S). Finally, weak cyclones visited the southern GBR (20^{O}S to 24^{O}S) much more recently than strong cyclones.

3.2 *INTRODUCTION TO TROPICAL CYCLONES*

The Australian Bureau of Meteorology defines a tropical cyclone as a "non-frontal synoptic scale cyclonic rotational low pressure system of tropical origin, in which 10 minute mean winds of at least 17.5 m/s (gale force) occur [with] the belt of maximum winds being in the vicinity of the system's centre" (McBride and Keenan 1982). Thus, cyclones (Figure 14) are

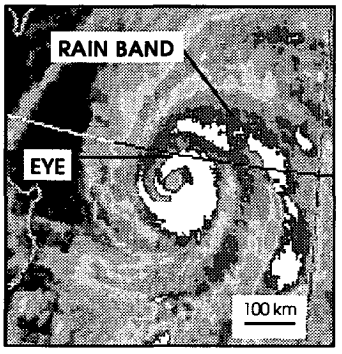

Figure 14: *Simplified profile of a typical tropical cyclone. Adapted from Willougby 1988.*

characterised by inward spiralling winds that create wide rain bands around the storm. The highest winds enclose a roughly circular region of relative calm known as the "eye" , which typically has a radius between 10-40 km (Willoughby 1988). Wind intensity gradually increases from near zero within the cyclone eye to a maximum velocity just outside the eye wall (termed the radius of maximum winds). For most cyclones, wind speeds decrease very rapidly with distance outward from the radius of maximum winds (Holland 1981). Occasionally, however, exceptionally small (Cyclone Ada 1970) or large (Cyclone Justin 1997) cyclones develop, where wind speeds decrease more rapidly or less rapidly with distance outward from the radius of maximum winds. The size of the cyclone does not necessarily relate to its intensity. However, the highest winds of a large storm of a given intensity will cover broader area than normal (Callaghan pers. comm.). Finally, cyclone wind speeds and wave heights tend to be highest on the left side of the cyclone path in the southern hemisphere (Young and Hardy 1993) except when cyclones move very slowly or not at all (Young 1988), which is rare.

Tropical Cyclone Formation. Cyclones form over areas of warm open ocean, and develop from pre-existing cloud clusters in these regions. In the Australian region, this confines the formation of the majority of cyclones (~95%) to an area roughly between 9^0 S and 19^0 S (McBride and Keenan 1982). Since cyclones rarely form with sea surface temperatures under 26.5^0C (McBride and Keenan 1982), the cyclone season in southwest Pacific / Australian region generally extends from November to May, with a peak in January and/or February (Holland 1984, McBride and Keenan 1982). Accordingly, we found that from 1969-1997

cyclones moved near the GBR from December to April, with a peak between January and March (Figure 15). In addition, we found that during the most intense months of the season

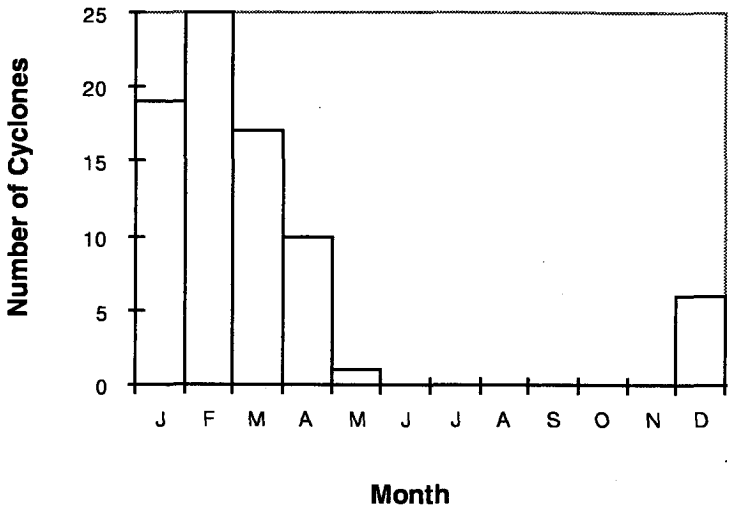

Figure 15: *Number of cyclones in the GBR region by month, 1969-1997.*

(January, February, March, April), cyclones covered nearly the entire GBR (Maps 38, 41, 44, 47). The far northern area between 10^0 S and 11^0 S, however, was crossed by only two cyclones (Stan 1979 and Faith 1972) during April (Map 47). December cyclones were concentrated between 13^0S and 14^0S and 15^0 S and 21^0S (Map 35). May cyclones were limited to 12^0 S -13^0S (Map 50).

Tropical Cyclone Movement. Cyclones are sustained in part by their movement over warm water and they quickly weaken once they move over land or cold water. However, relatively small exposed land areas, such as reef tops and continental islands have little effect on the strength of a cyclone. Although in the southwest Pacific the majority of cyclones move in a southeasterly direction (Holland 1984a & b), the most intense storms often move westward towards the north Queensland coast before recurving to the southeast (Holland 1984c). More than half of these cyclones decay at sea, and most of those that cross land are weakening (Holland 1984b & c).

Predicting the path of any given cyclone is very difficult as cyclone paths can be erratic at time scales of hours to days and space scales of tens to hundreds of kilometres (Holland and Lander 1993). Particularly difficult is determining, in real time, when a change in cyclone direction represents a transient detour versus a substantial track change (Holland and Lander 1993).

Cyclone paths can be affected by interactions both between the storm and the surrounding environment, such as the presence of other tropical cyclones, large and meso-scale atmospheric features (eg., trade winds, subtropical ridge), or by moving over land (Holland and Lander 1993), and by factors within the storm itself due to changes in the structure of the eye (Willoughby 1990).

The number, location, and intensity of cyclones in Australian waters varies considerably within and between years due to variations in sea surface temperatures, local air circulation, and the El Nino / Southern Oscillation cycle (Holland 1983, McBride and Keenan 1982). For example, from 1969 to 1997, 135 cyclones moved through Queensland waters with an average of 4.7 $\pm$2.1 cyclones per year (Table 1). Of these, 80 (57%) passed in or within

Region	*Mean*	*Standard Deviation*	*Range*	*Total*
Queensland	4.7	2.1	2-9	135
GBR region	2.76	1.5	0-6	80
Northern GBR	1	1.1	0-4	29
Central GBR	1.41	1.12	0-4	40
Southern GBR	1	1.13	0-4	29

Table 1: *Number of tropical cyclones per year from 1969-1997 by region. Note that some cyclones may pass within more than one region.*

100 km of the GBR region, with an average of 2.76 $\pm$1.5 cyclones per season. Half of these passed within the central portion of the GBR (15°S-19°S), while 36% passed within the northern (10°S-15°S) and southern (19°S-24°S) portions, respectively. Although considerably more cyclones passed through the central region of the GBR over the entire time period, the average number of cyclones per year was near one for each region. Similarly, the number of cyclones per season ranged from zero to four within each section of the GBR. For the GBR region as a whole, the number of cyclones ranged from zero to six, while between two and nine cyclones passed through Queensland waters per season.

The link between El Nino events and the location of cyclone paths has been explored in many recent studies (Lough 1994, Nicholls 1992, Garden et al. 1989, Dong 1988, Emanuel 1987,

Revell 1986, Chan 1985), generally suggesting that cyclones tend to form further out in the Coral Sea (eastward) during strong El Nino events due to lower than normal sea surface temperatures near the Queensland coast. However, since many factors influence the movement of cyclones once formed, the Southern Oscillation Index (SOI) alone cannot be used to predict how many cyclones will track near the GBR. To examine how the number of cyclones passing near or within the GBR region varied with the SOI from 1969-1997, we found: 1) the difference between the number of cyclones near the GBR each season and the previous season and 2) the difference between the mean SOI value for the months of the current and previous cyclone seasons (Maps 67-94). We found that, with the exception of the 1990-1991 season, when SOI values increased from the previous season, the number of cyclones tracking within or near the GBR increased (Figure 16). Similarly, when SOI values declined from the previous season, fewer cyclones tracked near or within the GBR. However, the magnitude of increase and decrease in the number of cyclones from the previous season varied little with differences in the magnitude of changes in SOI values (eg, similar numbers of additional cyclones were recorded for large and small changes in SOI). In addition, a variable lag is evident between the number of cyclones and the SOI values. No consistent pattern in the direction of the lag is evident, which makes sense given that so many

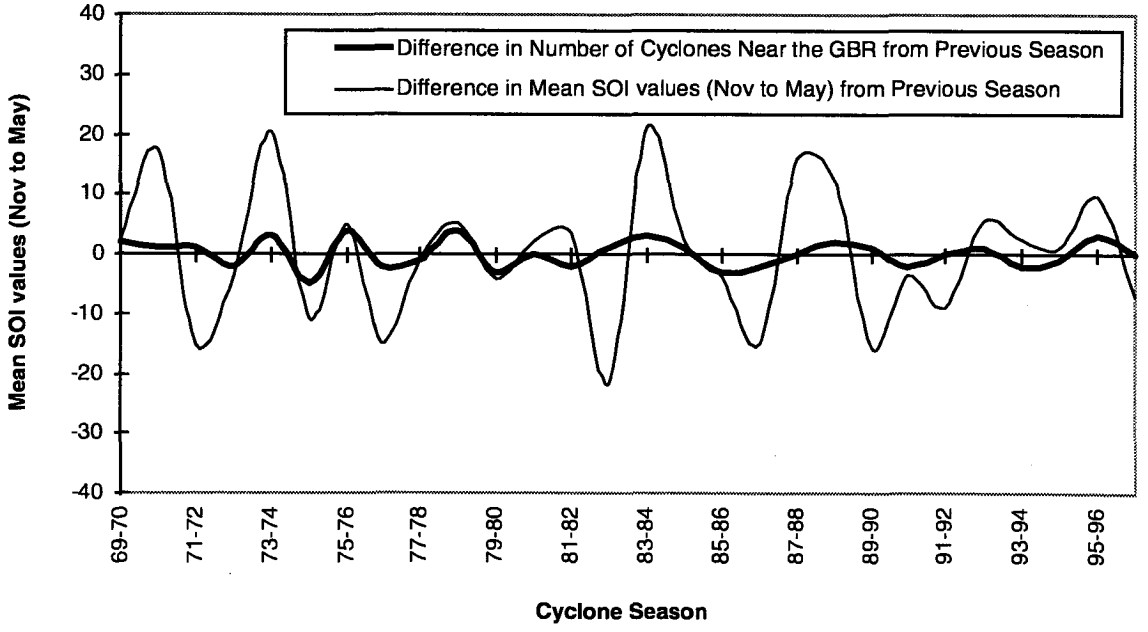

Figure 16: *Difference in the number of cyclones passing near the GBR region each season from the previous season (thick line) and the difference between mean values of the Southern Oscillation Index (SOI) for the months of the cyclone season (November-May) each season from the previous season (thin line). Data source: Bureau of Meteorology, 1997.*

highly variable factors affect whether or not a cyclone forms and tracks near the GBR region even when the SOI indicates that conditions for cyclone presence are favourable.

Tropical Cyclone Tracking in Australia. Cyclone forces are rarely measured directly due to the obvious dangers posed by high winds and waves, the tendency of instruments to fail when maximum conditions are reached, and the difficulty of predicting where a cyclone will move. Although it is possible to obtain direct measurements by flying through storms with specially designed aircraft, in Australia this has only been done for two cyclones, Kerry and Rosa in 1978-79 (Lourensz 1981). Meteorologists rely on land-based radar, satellite imagery (Dvorak 1975), and observations from ships and remote automatic weather stations at reefs to detect and estimate the basic characteristics of cyclones, such as their location, central pressure, and radius of maximum winds (Lourensz 1981). They have developed a range of mathematical models for predicting the magnitude of cyclone-generated forces (winds and waves) from these basic storm characteristics (eg., Young 1988, Holland 1980).

The Australian Cyclone Database. The Severe Weather Section of the Queensland Bureau of Meteorology maintains an extensive digital database of cyclones passing near the Queensland coast dating back as early as the turn of the century (Davidson and Dargie 1996). The estimated location of each cyclone at 6 hourly, 3 hourly or 1 hourly intervals is provided, along with central pressure, speed and direction measurements and category ranking. This data is provided free of charge for research purposes.

However, there is considerable error in the cyclone database due to the lack of direct observations (Davidson and Dargie 1996, Holland 1981). For example, even today, pinpointing the location of the storm's eye at any given time is based on subjective analysis of satellite and radar imagery and observations from ships and weather stations. Tracking the location of storms is typically easier for more intense storms (Figure 17), as the cyclone eye

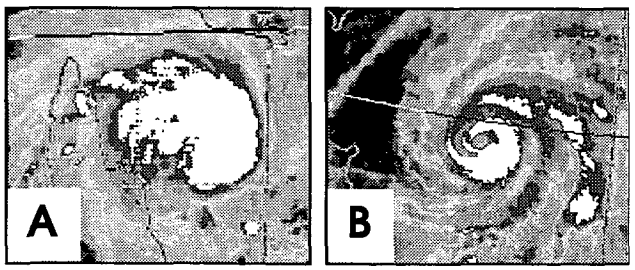

Figure 17: *Satellite images of tropical cyclone eyes. Note that though the cyclones are of similar intensity, in [b] the eye is clearly visible, and in [a] it is obscured by upper atmosphere clouds.*

usually becomes more clearly defined as the storm strengthens (Holland 1981), though high level cloud may obscure even a well-defined eye. Cyclones that track closer to land (eg., fall within range of coastal radar) can be analysed with greater accuracy. A detailed examination of the quality of the Australian tropical cyclone database found that before 1969, when satellite imagery became widely available, meteorologists had great difficulty in detecting and tracking cyclones beyond radar range (Holland 1981). This is the reason we have limited our study to those cyclones from 1969 to 1997. For these cyclones, Holland (1981) estimates errors in the position of the cyclone eye from $\pm$ 20-50 km for storms within 500 km of the coast, and 50-100 km for storms beyond. In addition, central pressures are typically overestimated by up to 15 hPa (underestimating cyclone intensity), and error estimates are themselves uncertain. Current research is investigating ways of reducing errors in the database (Davidson and Dargie 1996).

Tropical Cyclone Intensity. Cyclones are powered by the difference in pressure between the center of the storm (central pressure) and the ambient environment. Since variations in the ambient pressure are typically minimal, the central pressure alone provides a reasonable indication of cyclone intensity. Cyclones intensify as central pressures fall. The lowest central pressure on record (Typhoon Tip) was 888 hPa, recorded in the North Pacific in 1979. Cyclones near the GBR region are typically far weaker (Figure 18). Since 1969, the minimum central pressure recorded was 940 hPa, Cyclone Joy, December 1990.

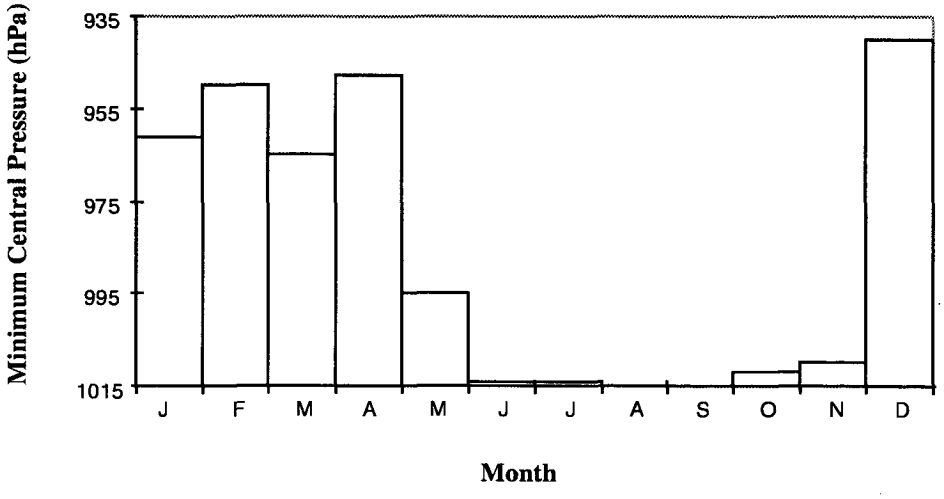

Figure 18: *Minimum central pressures recorded in the GBR by month, 1969-1997.*

Tropical Cyclone Categories. The Australian Bureau of Meteorology rank cyclones based on central pressure and maximum wind speeds (Table 2). In other parts of the world (eg, the

USA), another system, the Saffir-Simpson scale (Simpson and Riehl 1981) is used. Note that category 1 on the Saffir-Simpson scale is roughly equivalent to category 3 on the Australian

Category	*Average Wind (m/s)*	*Strongest Gust (m/s)*	*Central Pressure (hPa)*
0	At least 17	-	~1000
1	17-25	<35	1000-985
2	25-33	35-47	985-970
3	33-44	47-62	970-945
4	44-56	62-78	945-920
5	>56	>78	<920

Table 2: *The Australian scale for ranking cyclone intensity by central pressure and maximum wind speeds.*

scale. We found that weak (categories 0, 1, 2) cyclones have been much more common in the GBR region between 1969 and 1997 than strong (categories 3, 4, 5) cyclones (Figure 19). In fact, only two cyclones have intensified to category four and none to category five.

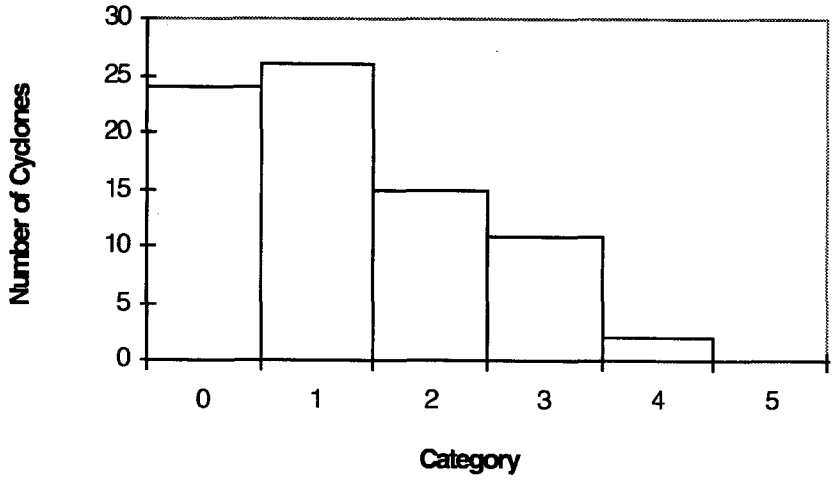

Figure 19: *Number of cyclones by maximum category near the GBR region, 1969-1997.*

Weak cyclones have covered most of the GBR (Maps 7, 15, 19, 23), while strong cyclones have been more concentrated:

- no category three storms have occurred north of 14^0S (Map 11, 27),
- category four storms have been limited to 15-19^0S (Map 11, 31).

However, both weak and strong cyclones have been relatively rare between 10^0S and 11^0S (Figure 20), where only two weak cyclones have passed from 1969-1997 (Stan 1979 and

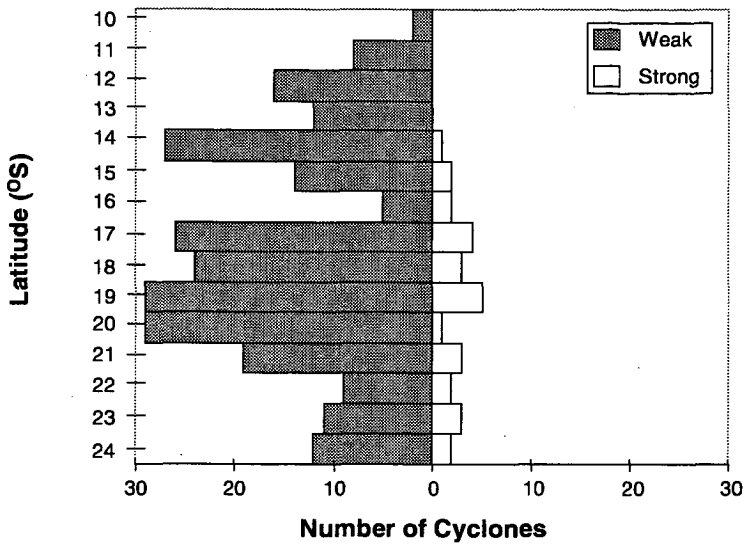

Figure 20: *Number of weak (categories 0, 1, 2) and strong (categories 3, 4, 5) cyclones near the GBR region by latitude from 1969-1997.*

Faith 1972). The maximum category reached by cyclones in the GBR region from 1969-1997 also varied by month (Figure 21). With the exception of May, each month of the

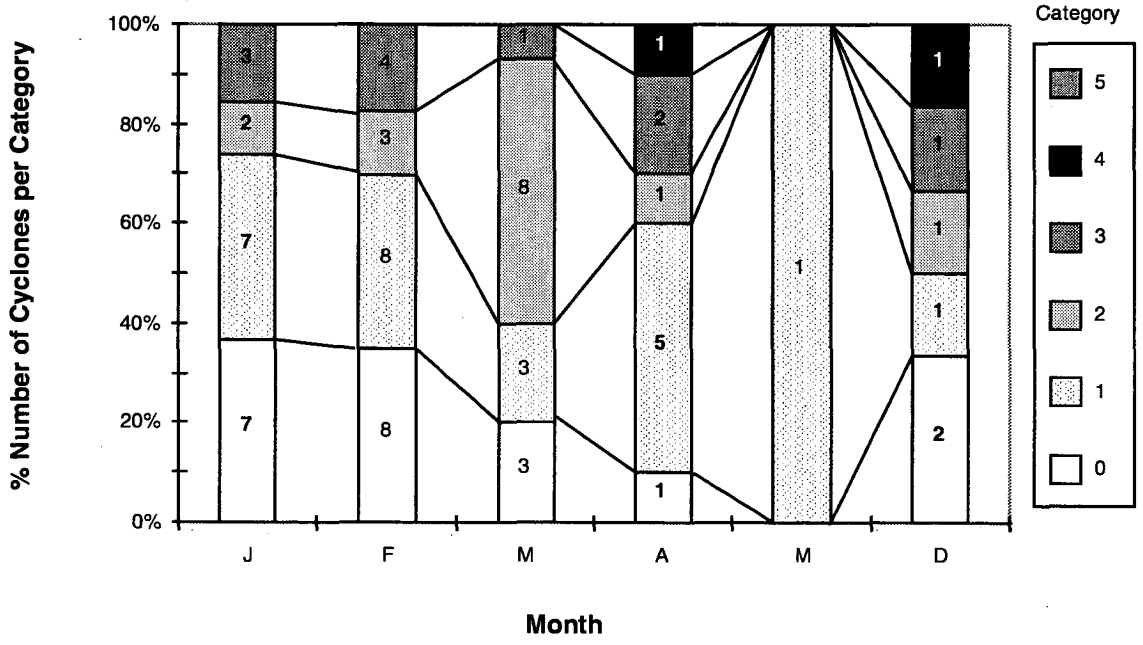

Figure 21: *Percentage of the total number of all cyclones in each category per month in the GBR region, 1969-1997. Values indicate the number of cyclones in each category for each month.*

cyclone season included at least one of each of the weaker categories. In contrast, although category three cyclones occurred every month except April, only two category four cyclones have passed near the GBR region since 1969; Cyclone Aivu in April 1989 and Cyclone Joy in

December 1990. Accordingly, December and April cyclones were the most evenly spread across categories, while May was limited to a single category one cyclone.

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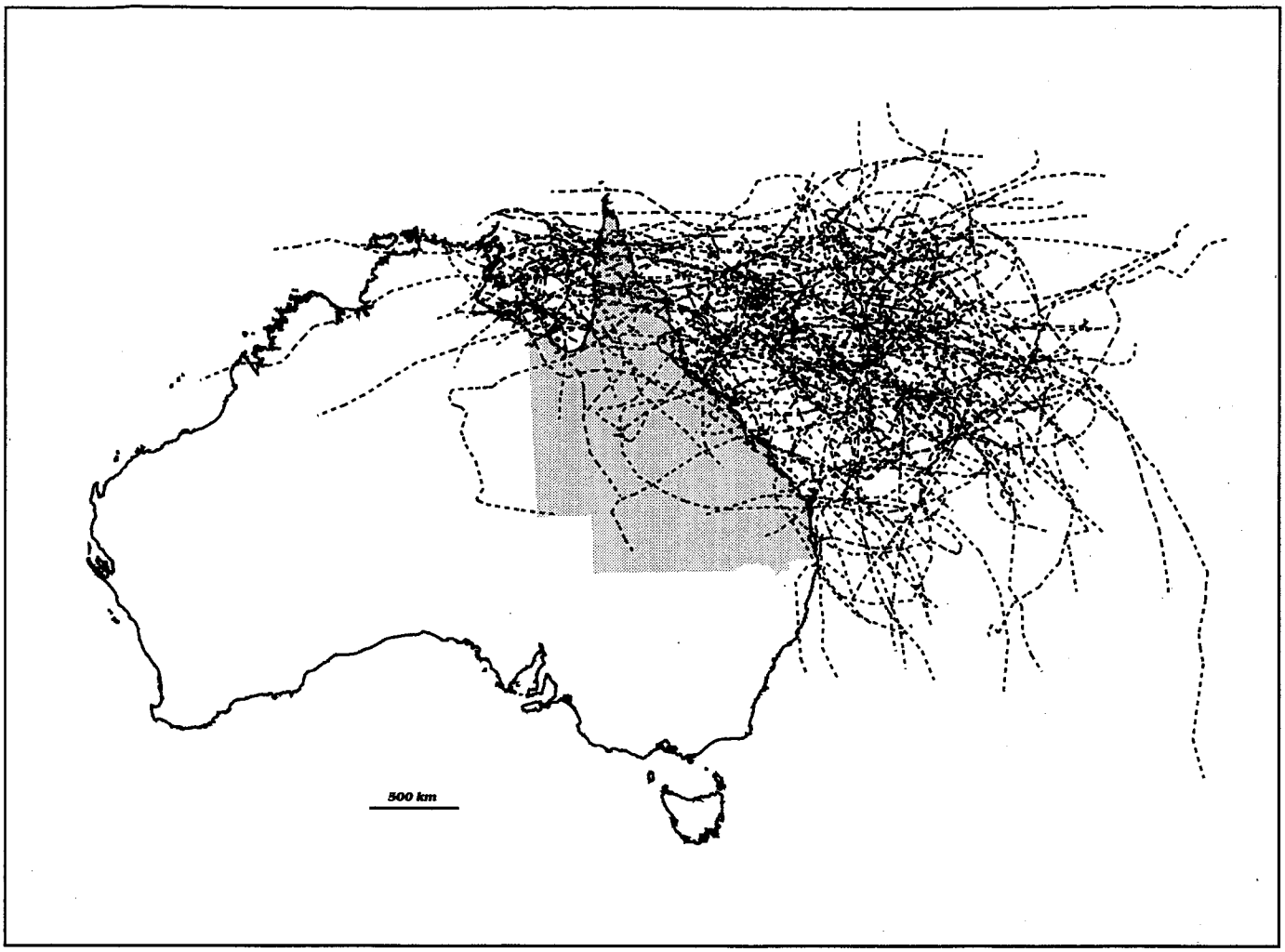
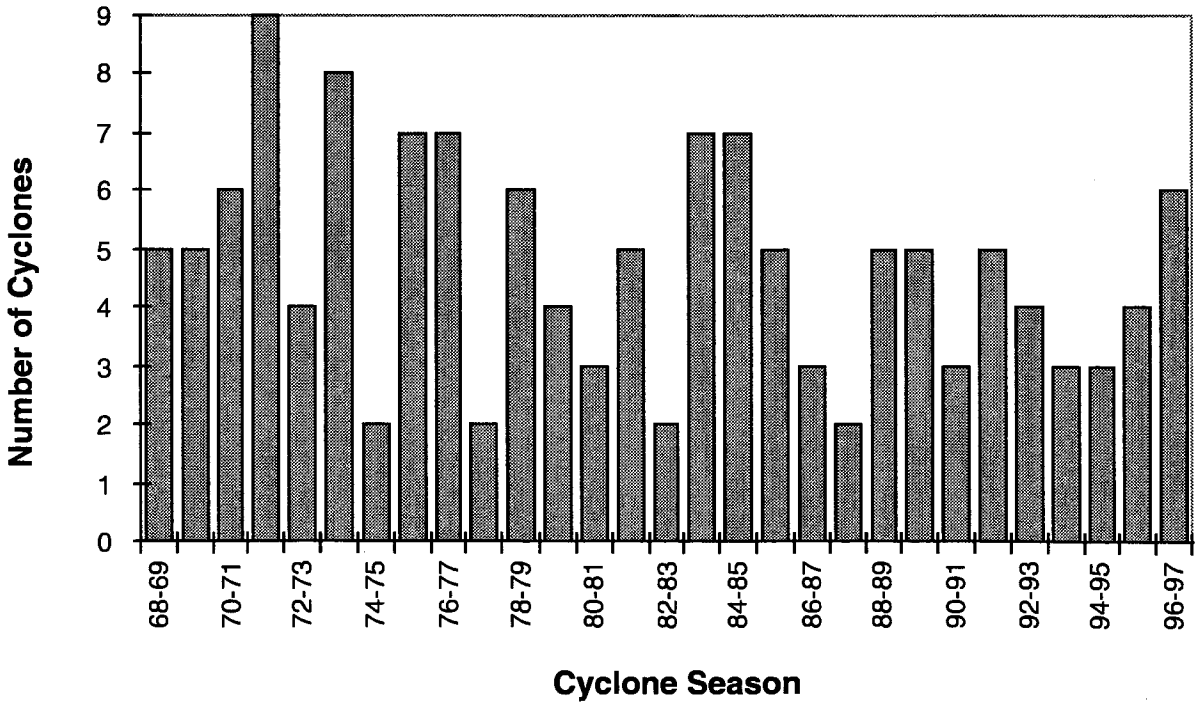
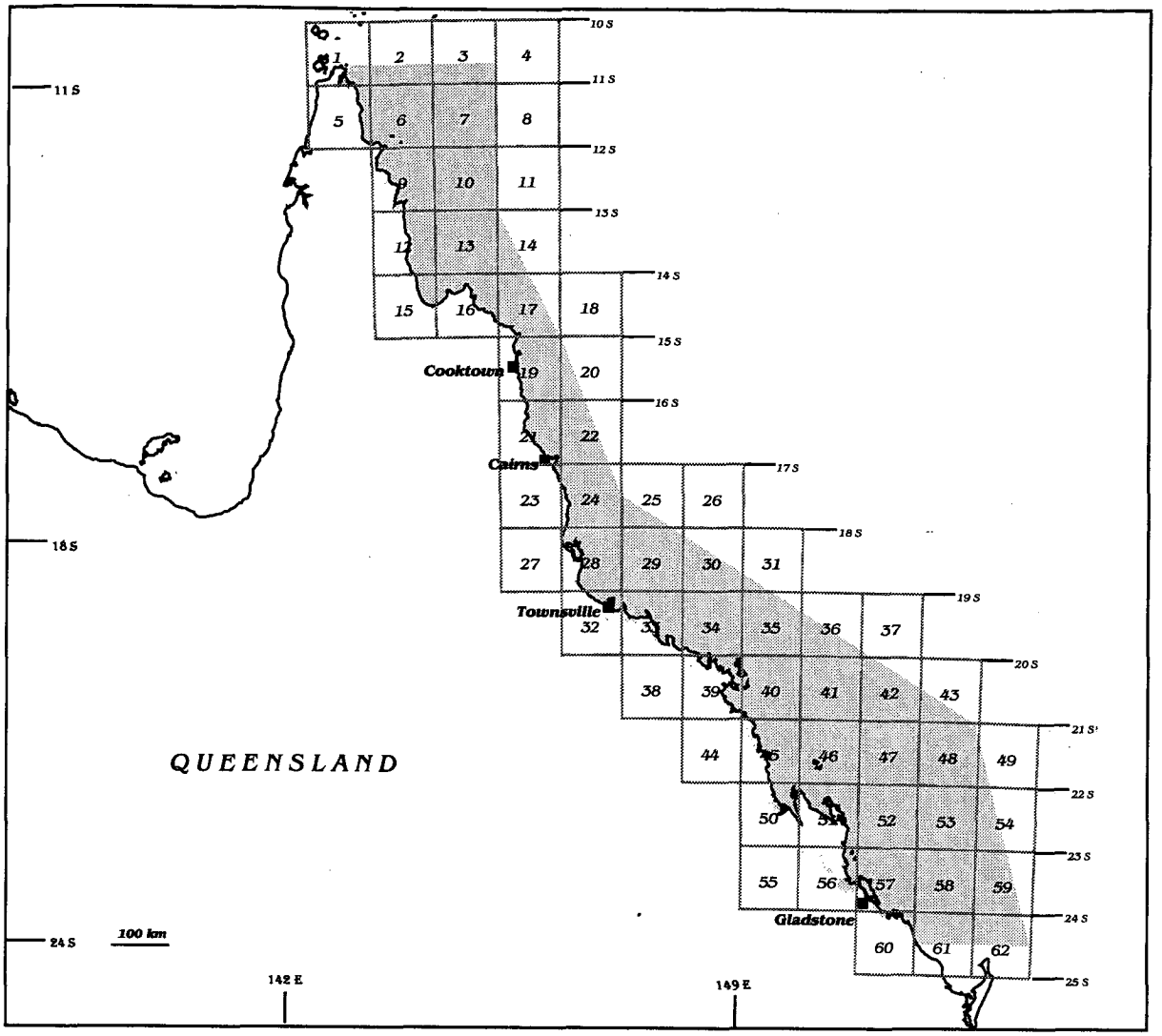




Map 1: *Tropical cyclone paths through Queensland waters, 1969-1997. Dashed lines represent the cyclone paths and the shading identifies Queensland.*



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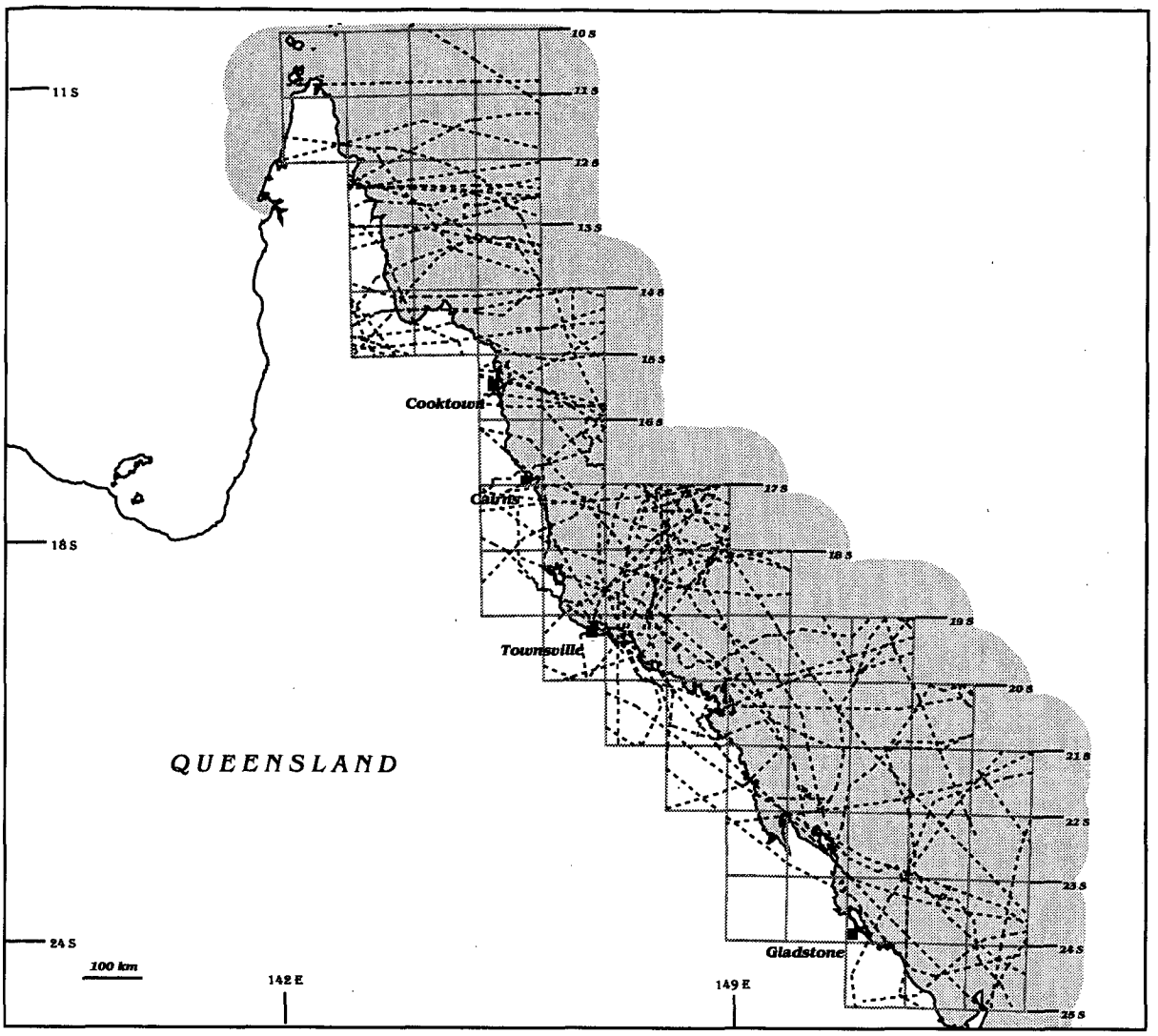
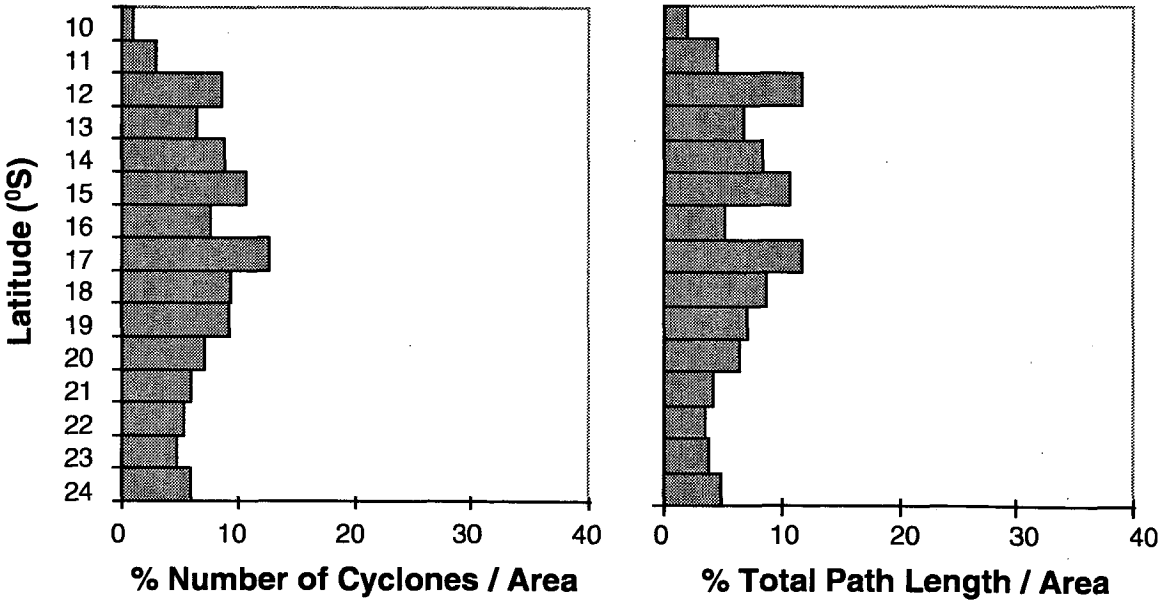
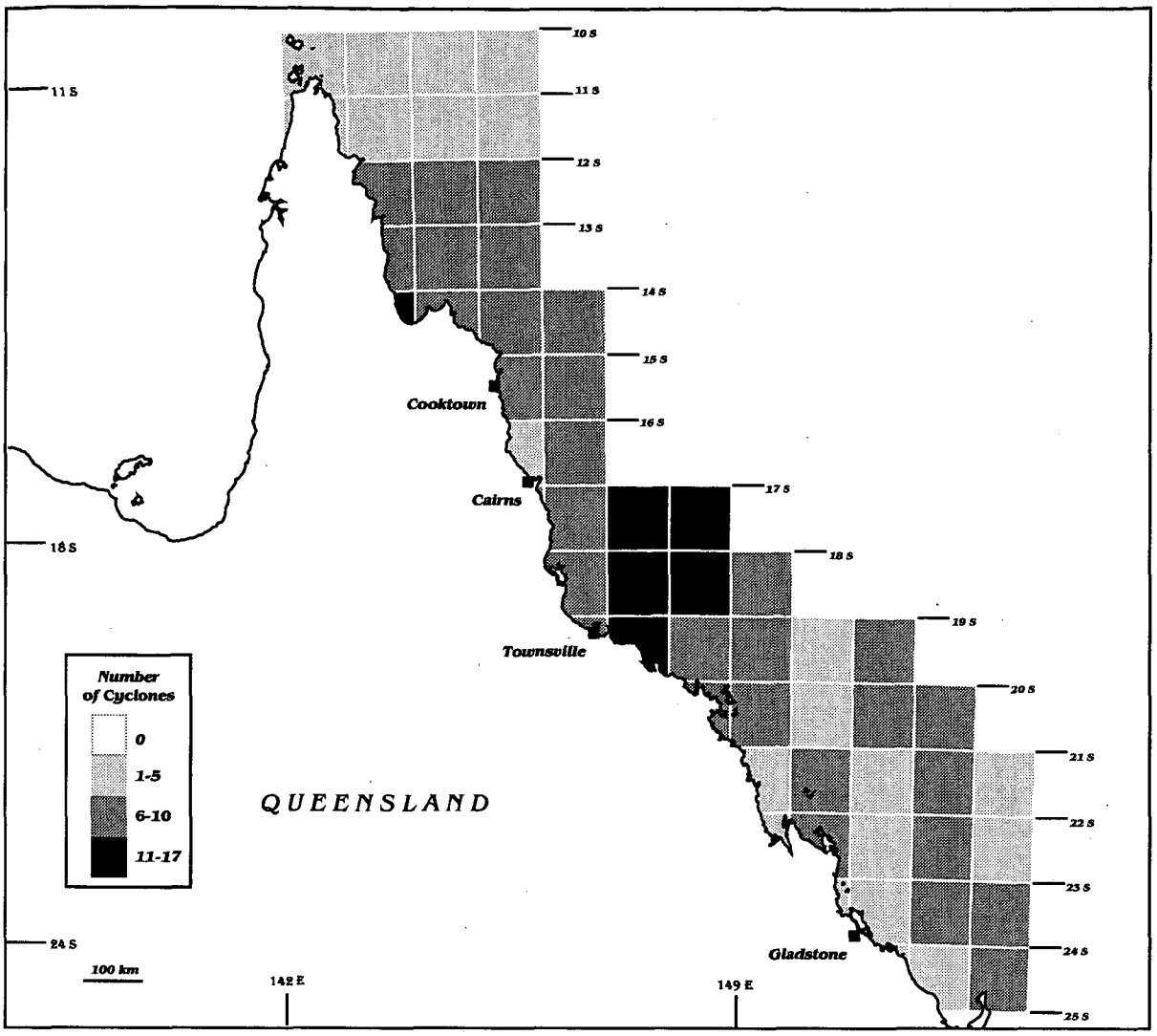
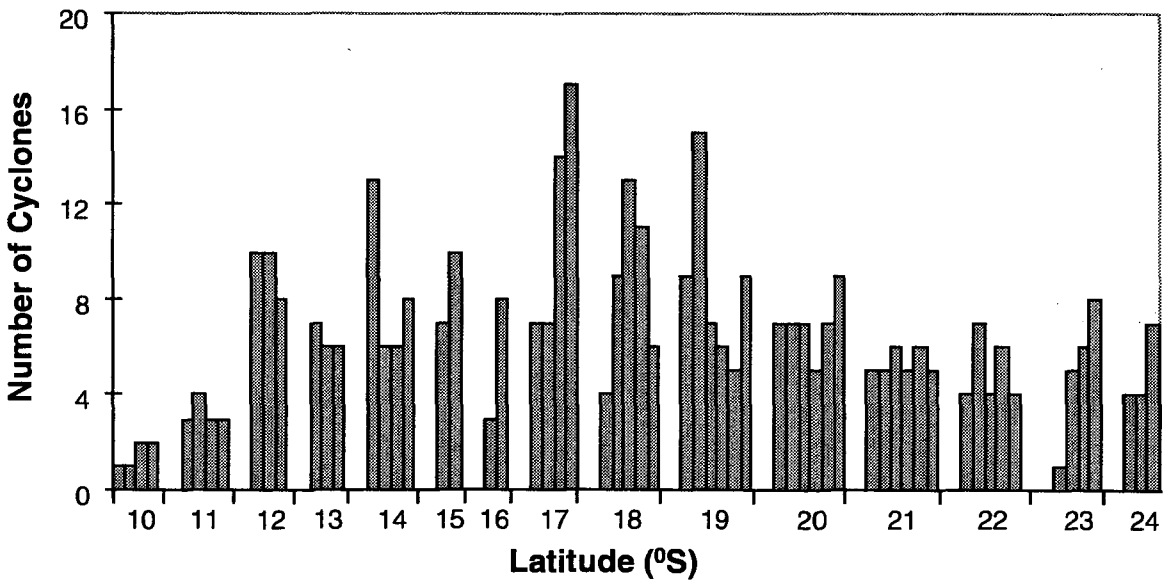
Map 2: *The Great Barrier Reef Region divided into one degree latitude by one degree longitude boxes. The gray shaded area outlines the boundary of the GBR Region.*



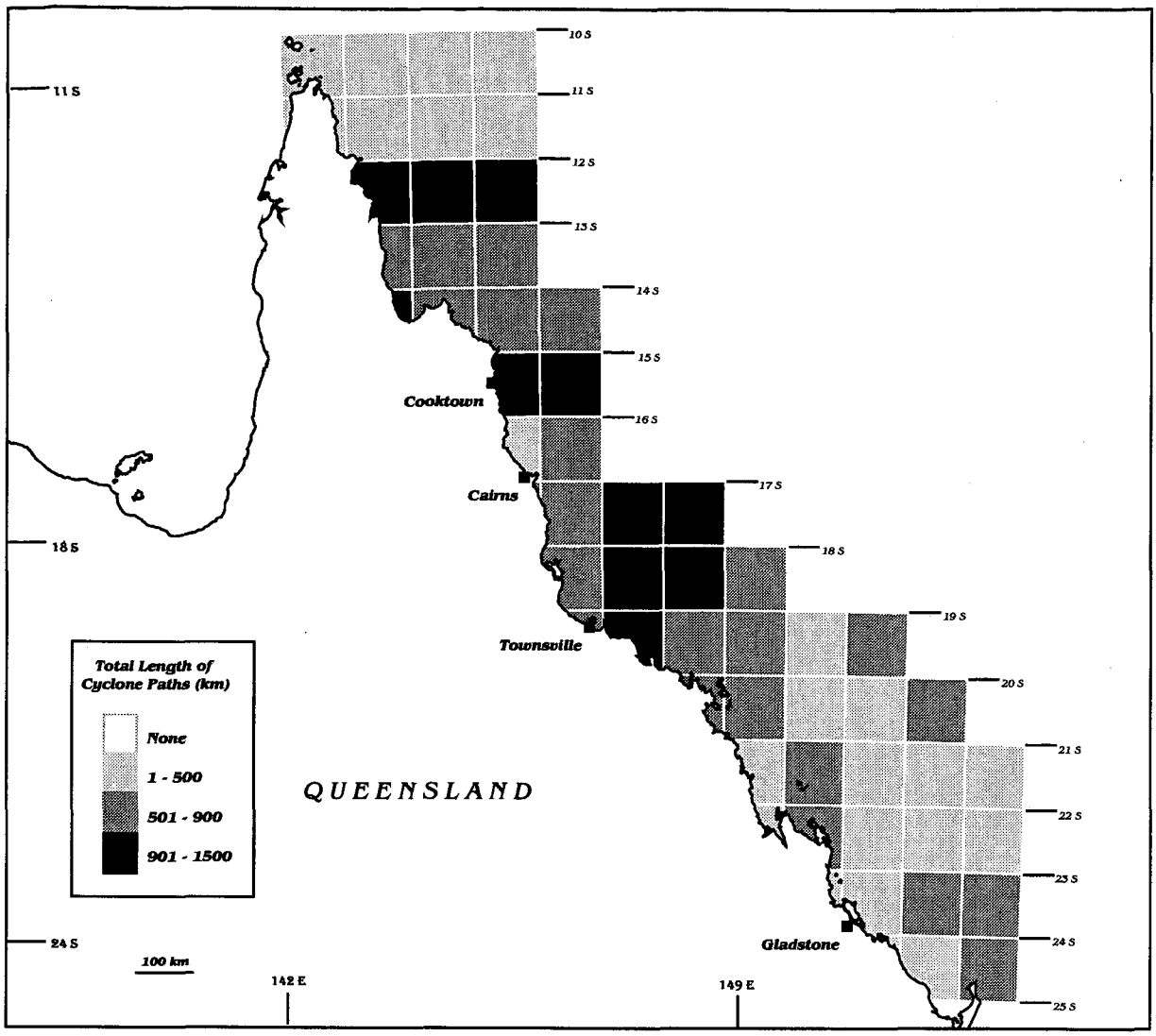


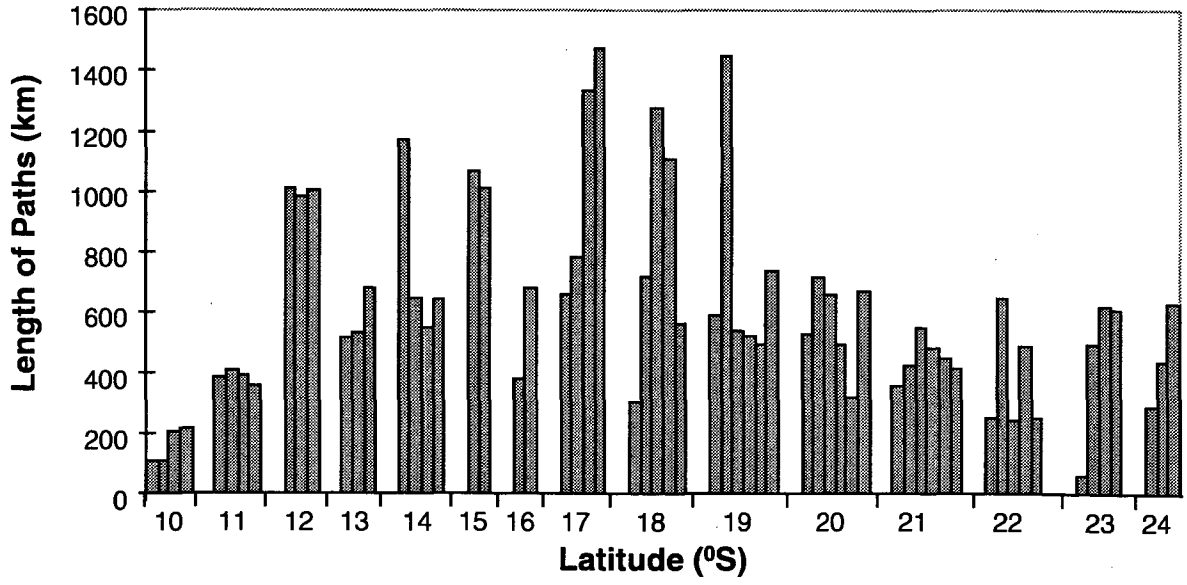
Map 3 : *<u>All cyclones 1969-1997</u>. The dashed lines represent cyclone paths and shading indicates areas located within 100 km of at least one path. The graphs indicate peaks in the number and total path length of all cyclones by latitude.*



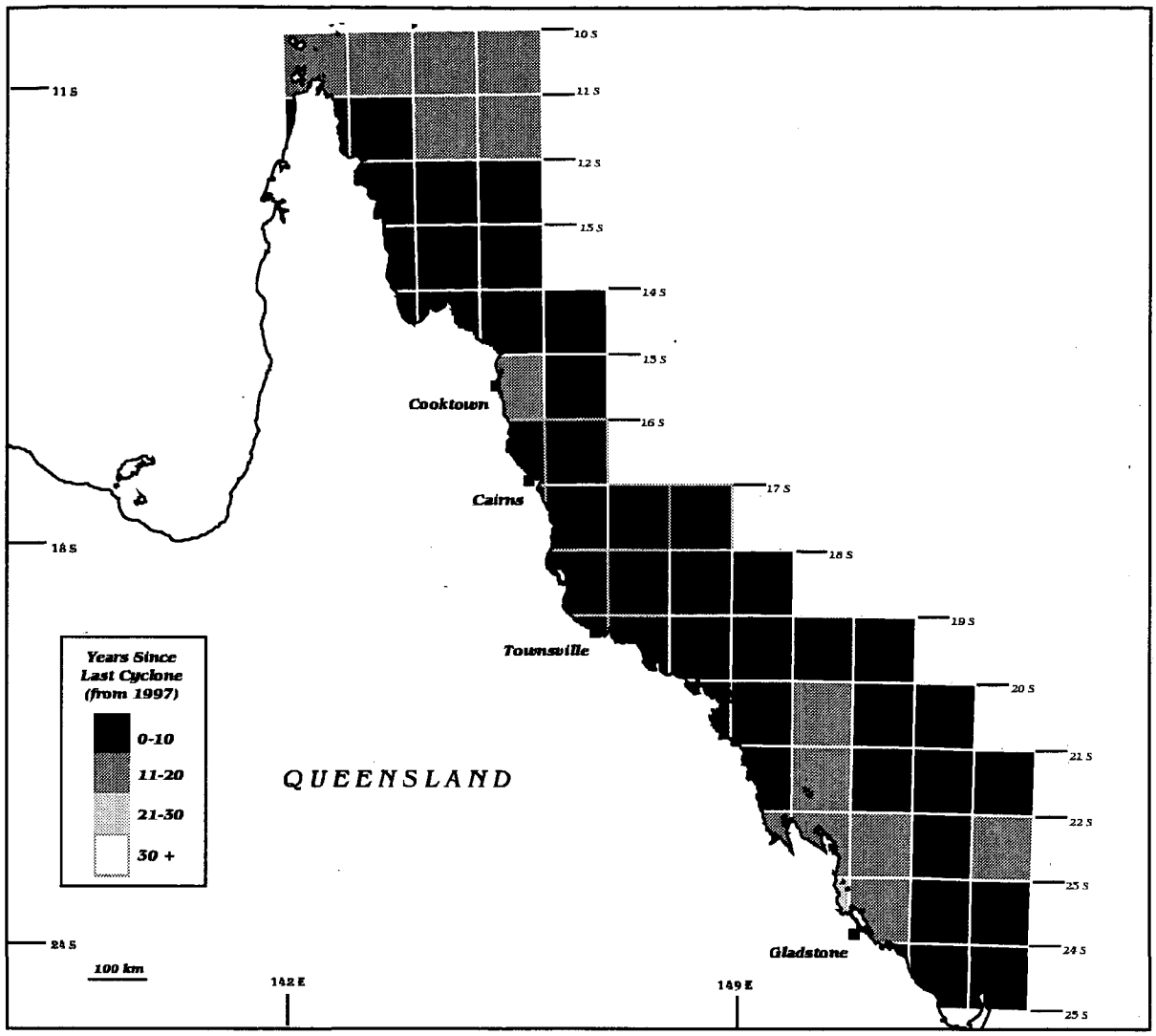


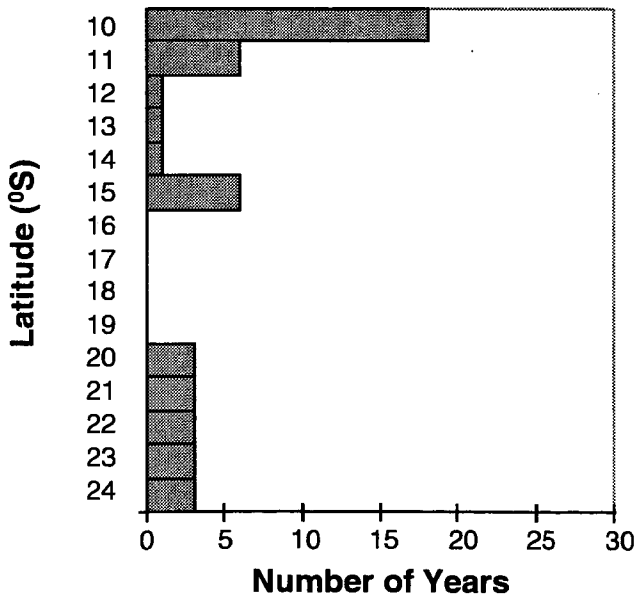
Map 4 : *<u>All cyclones 1969-1997: number of cyclones</u>. Seperate bars for each latitude depict the values for each 1^0 latitude by 1^0 longitude box.*



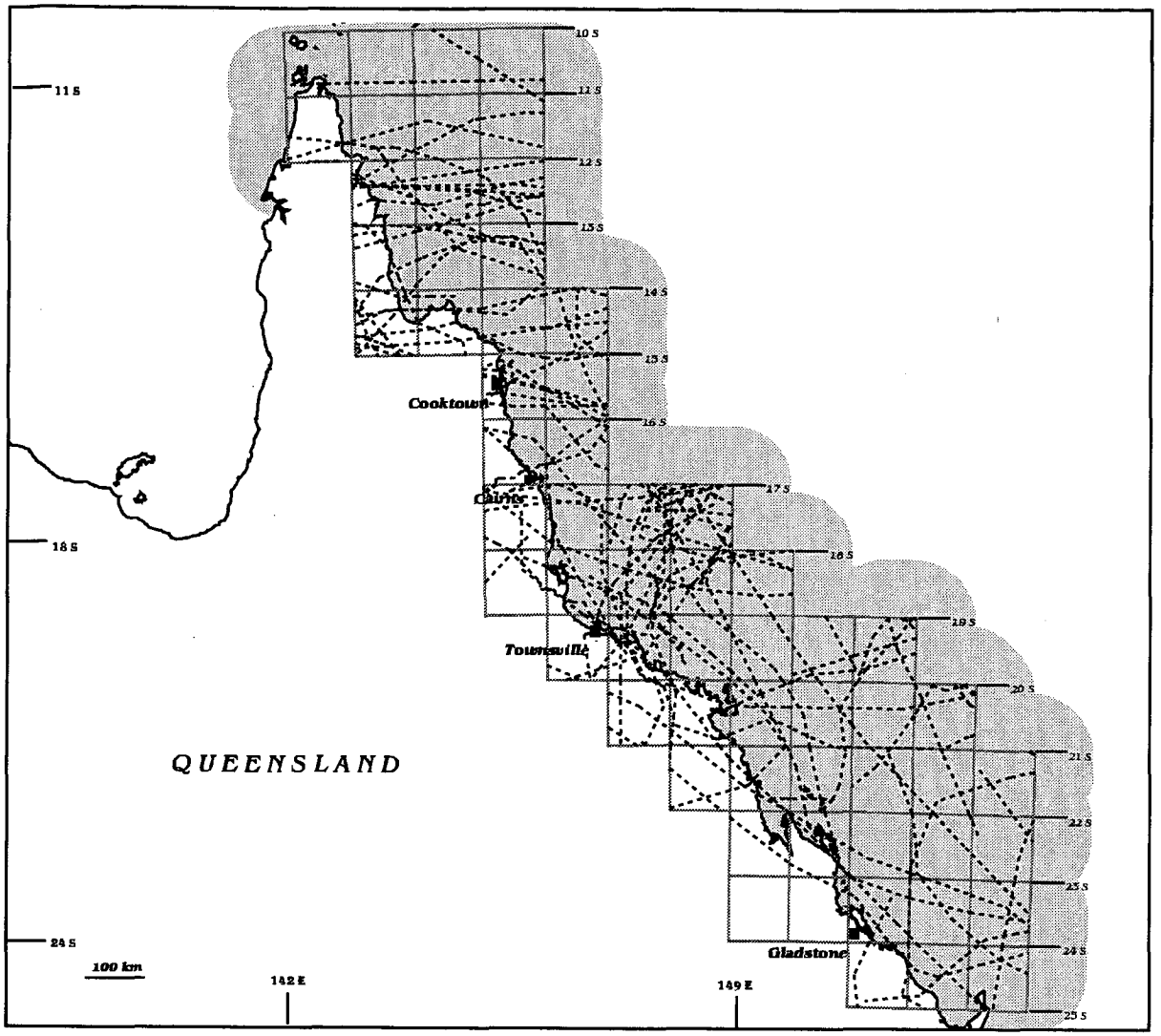


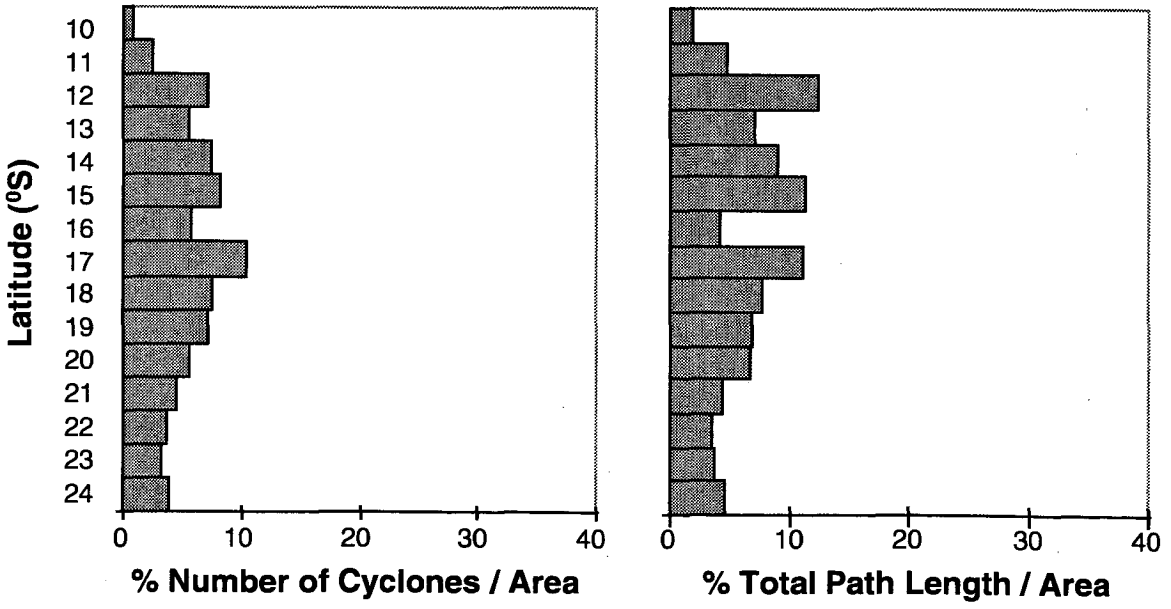
Map 5: *<u>All cyclones 1969-1997: total length of cyclone paths per box</u>. Seperate bars for each latitude depict the values for each 1^0 latitude by 1^0 longitude box.*



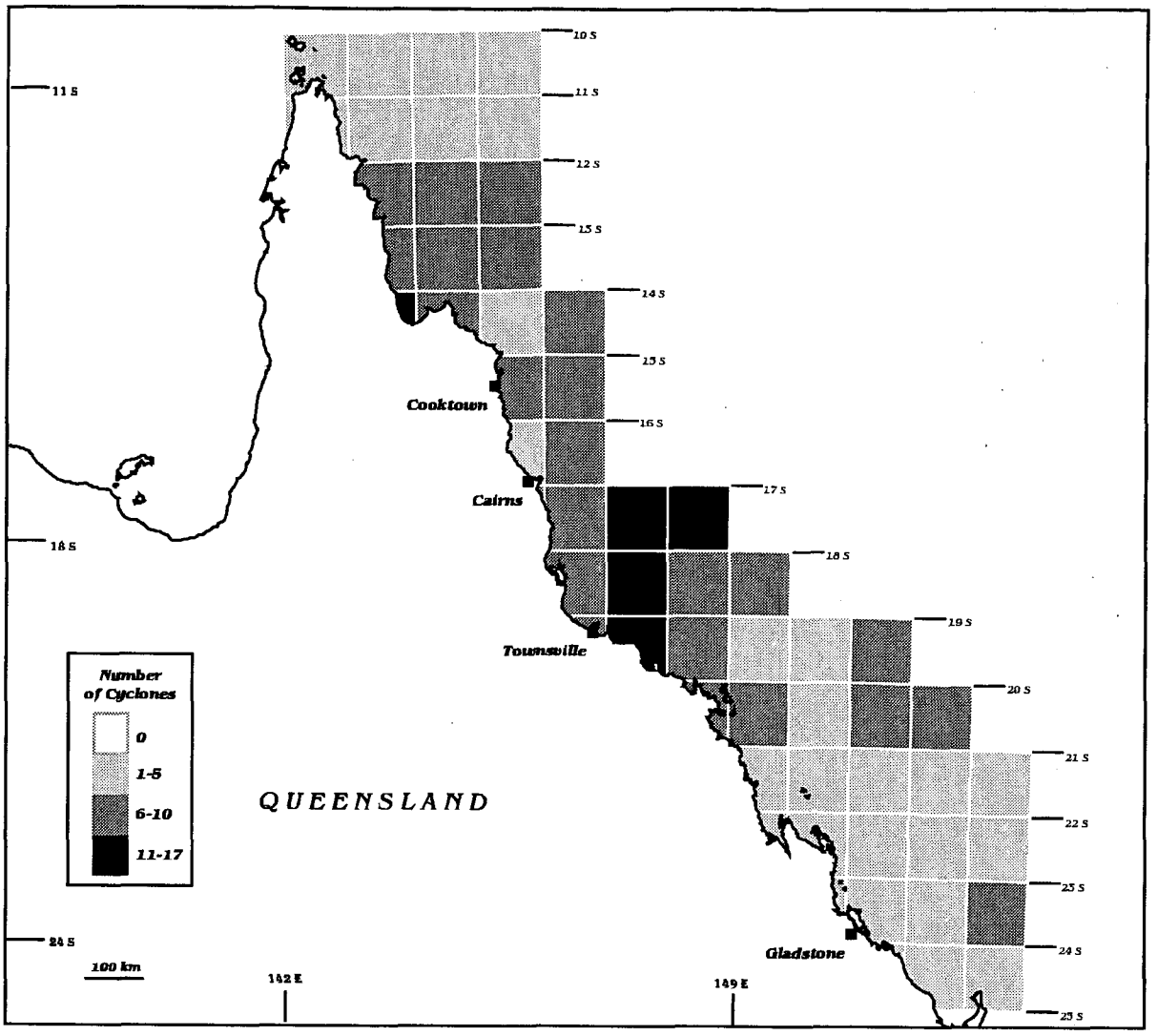


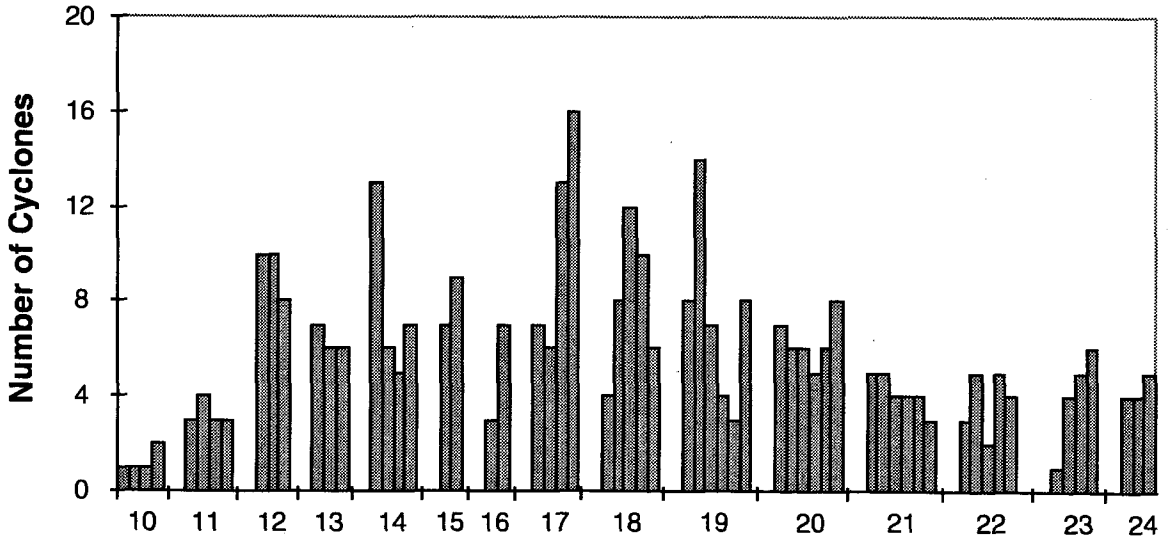
Map 6 : *Number of years before 1997 since the last cyclone. Boxes classified as 30+ years have had no cyclones pass through them from 1969 to 1997.*



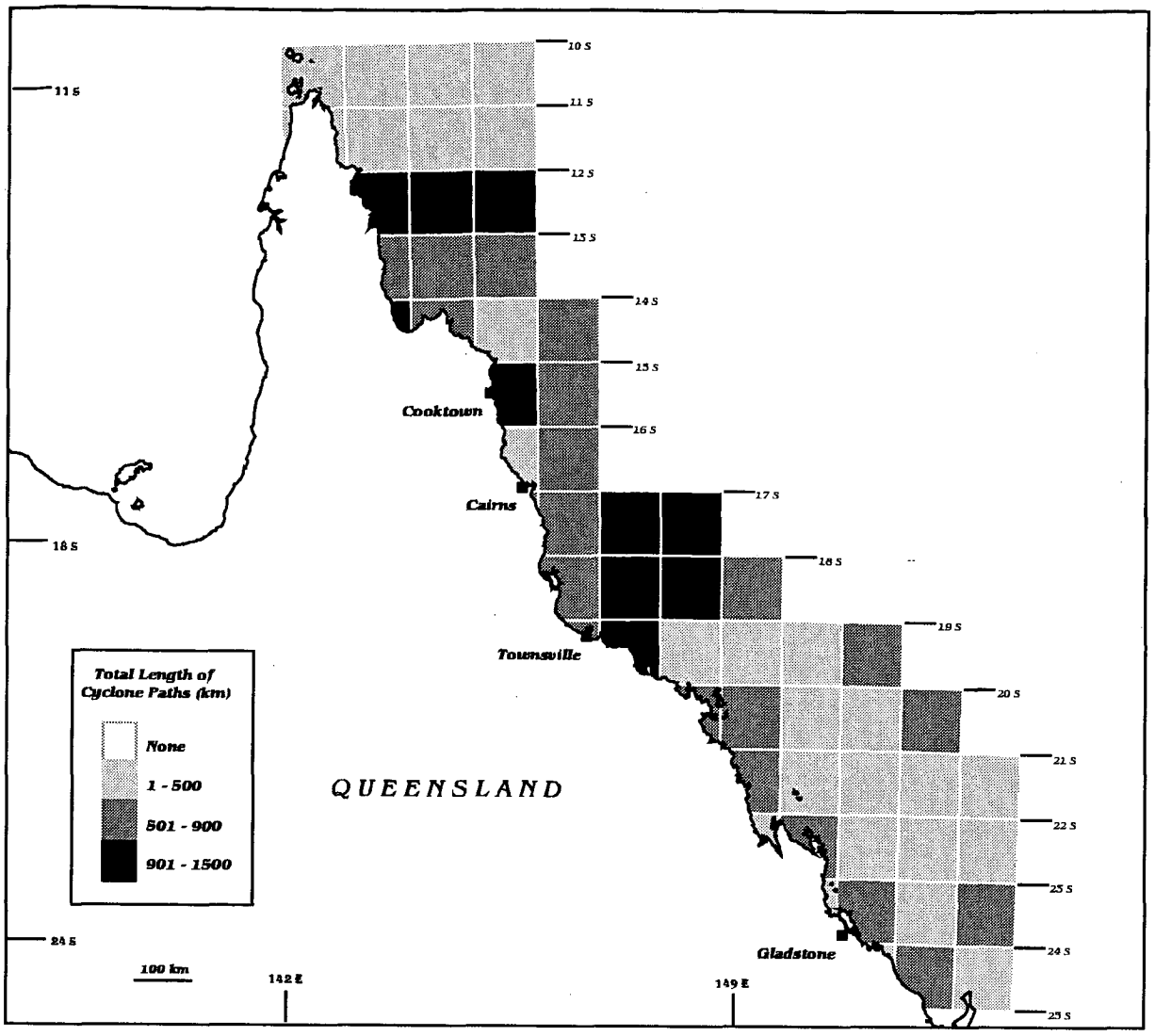


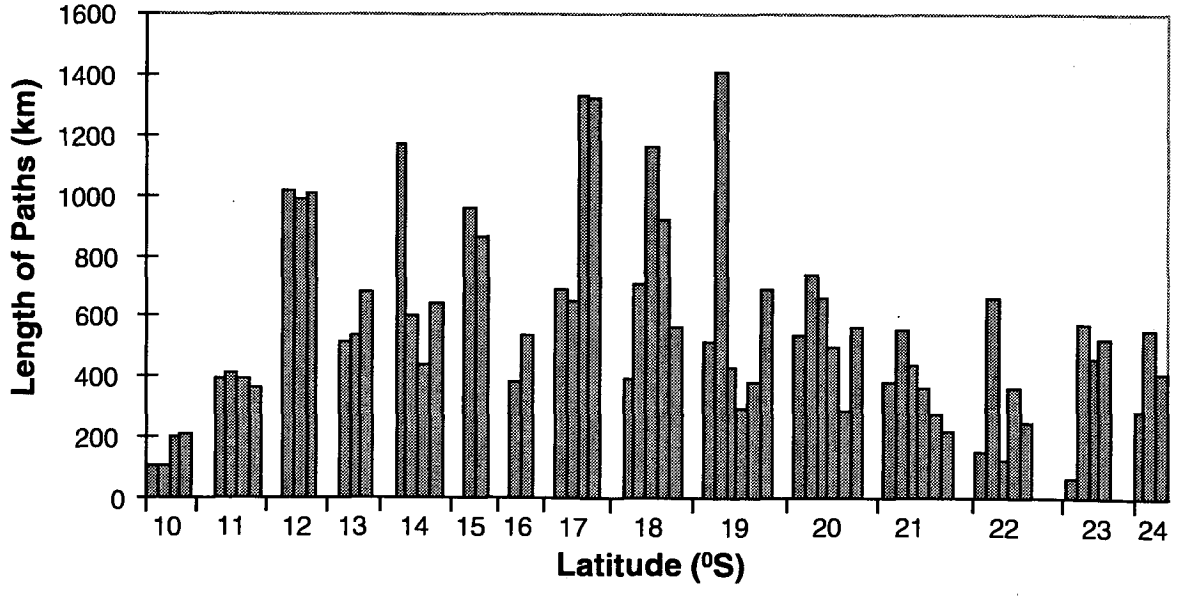
Map 7 : *<u>All weak (categories 0-2) cyclones 1969-1997</u>. The dashed lines represent cyclone paths and shading indicates areas located within 100 km of at least one path. The graphs indicate peaks in the number and total path length of all weak cyclones by latitude.*



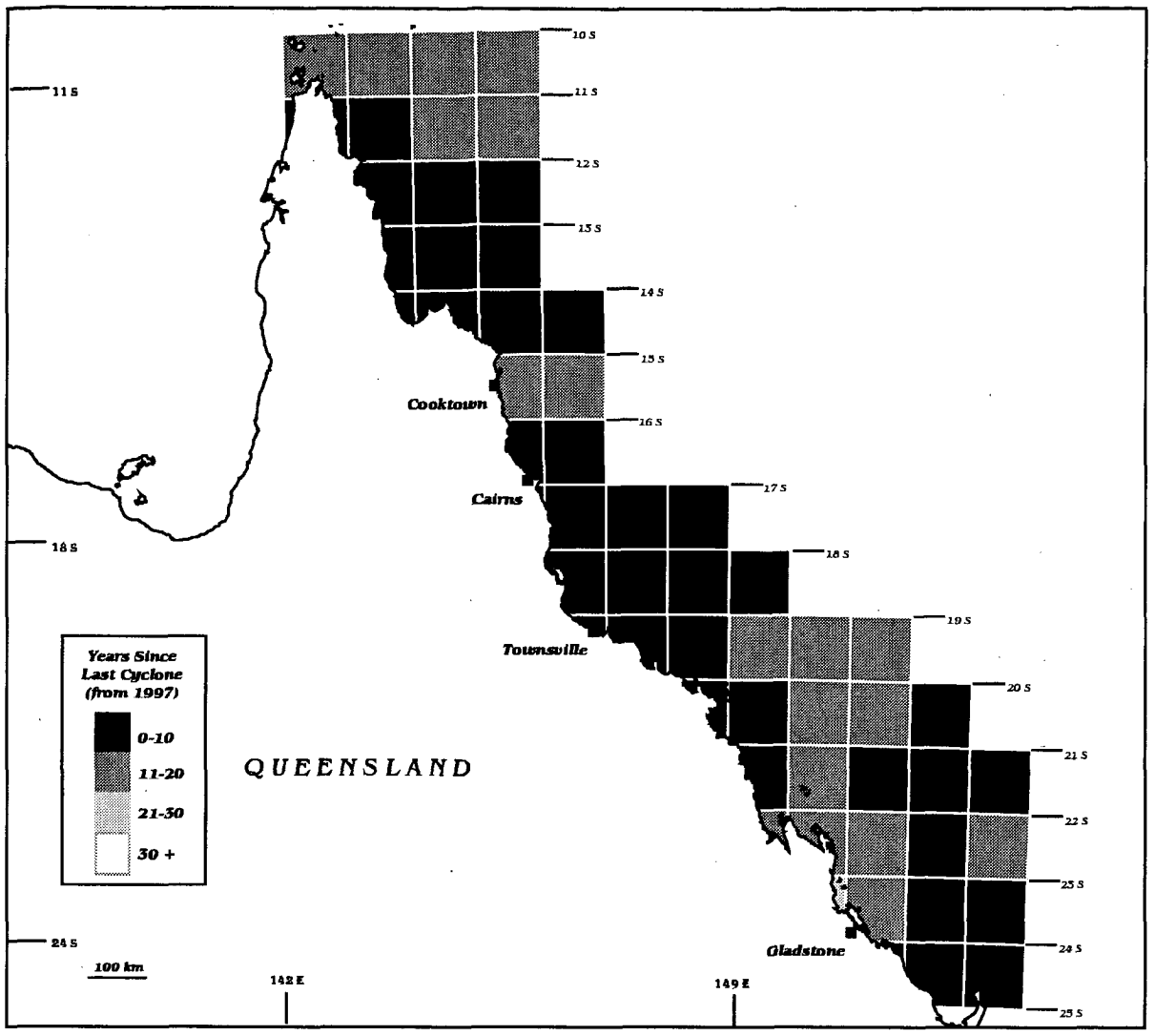


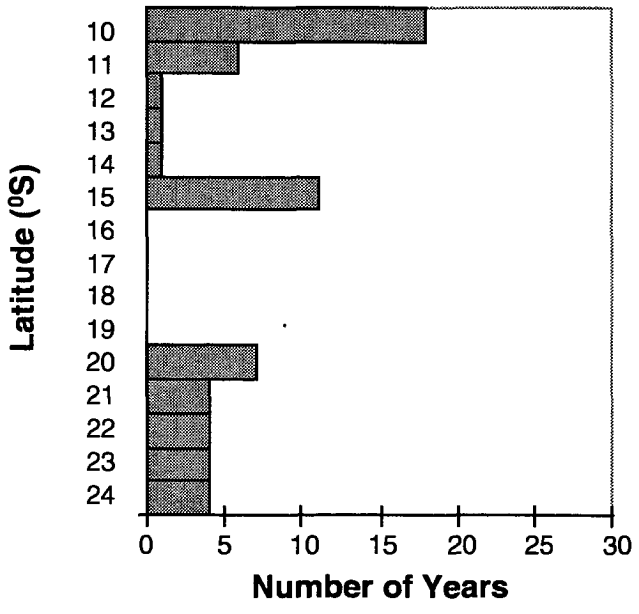
Map 8 : *<u>All weak (categories 0-2) cyclones 1969-1997: number of cyclones</u>. Seperate bars for each latitude depict the values for each 1^0 latitude by 1^0 longitude box.*



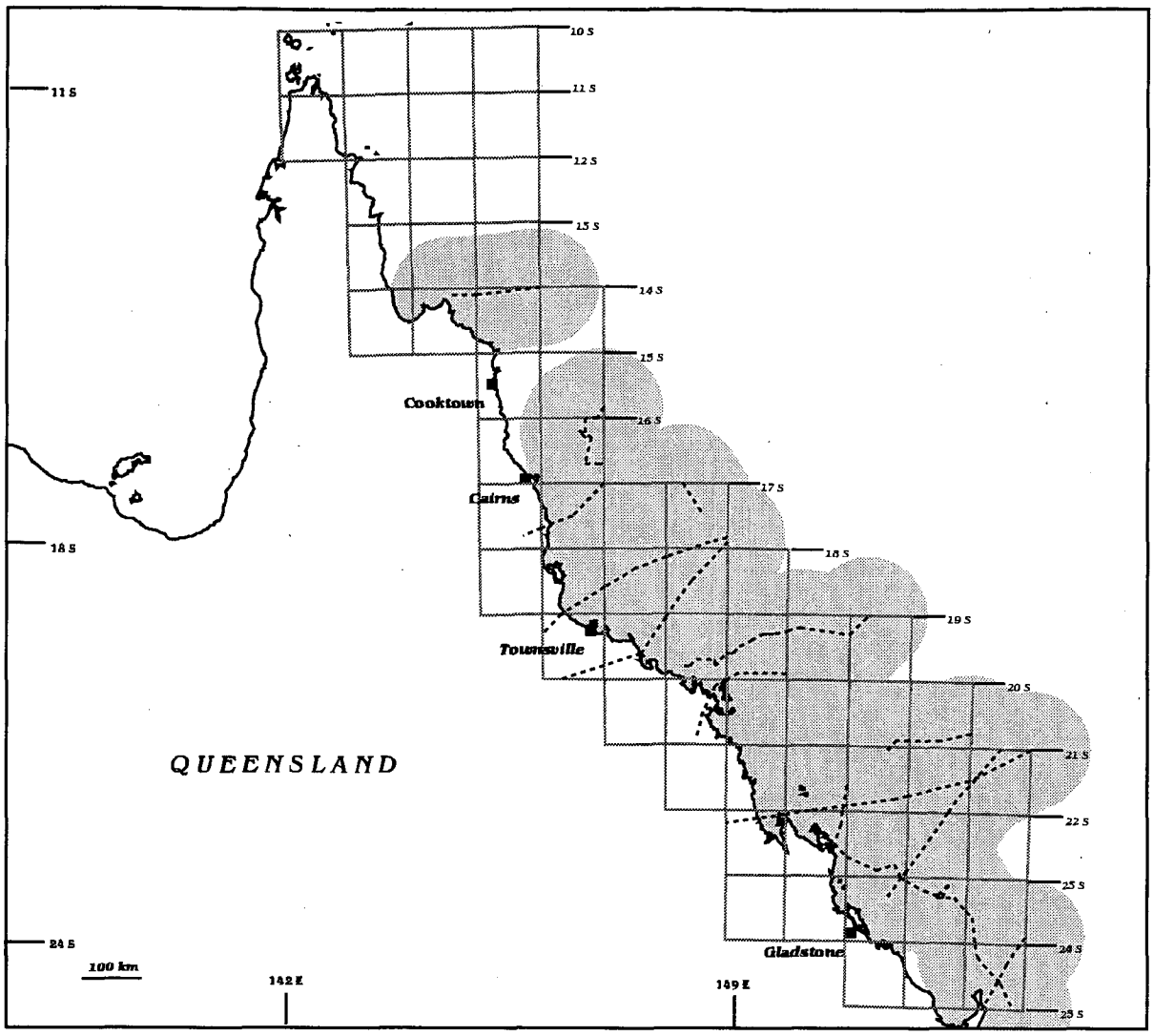


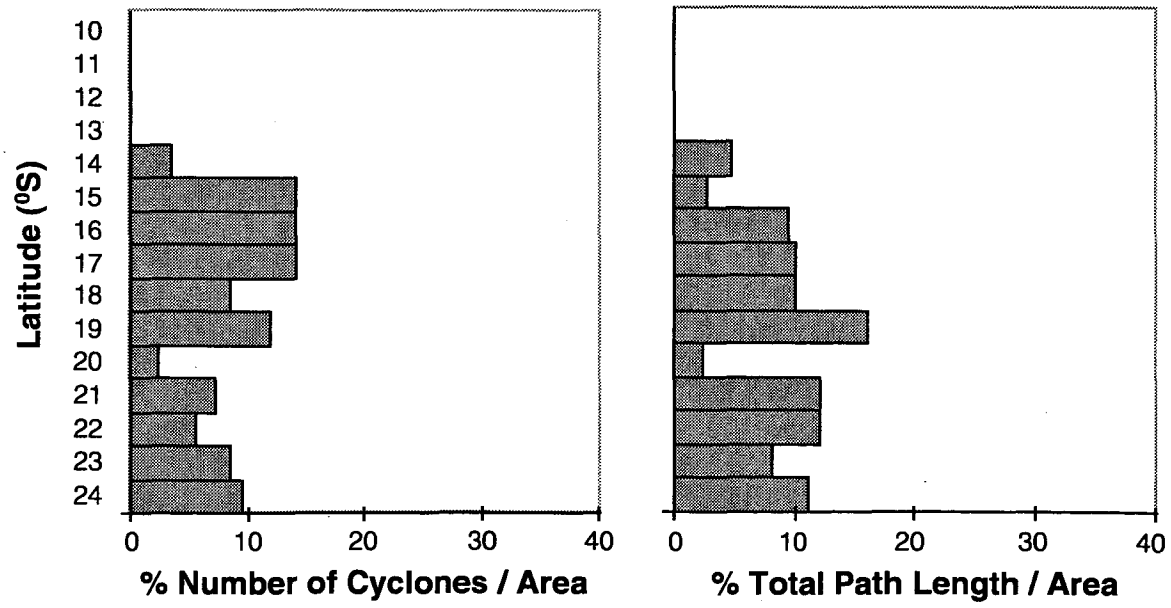
Map 9: *<u>All weak (categories 0-2) cyclones 1969-1997: total length of cyclone paths</u>. Seperate bars within each latitude depict the values for each 1^0 latitude by 1^0 longitude box.*



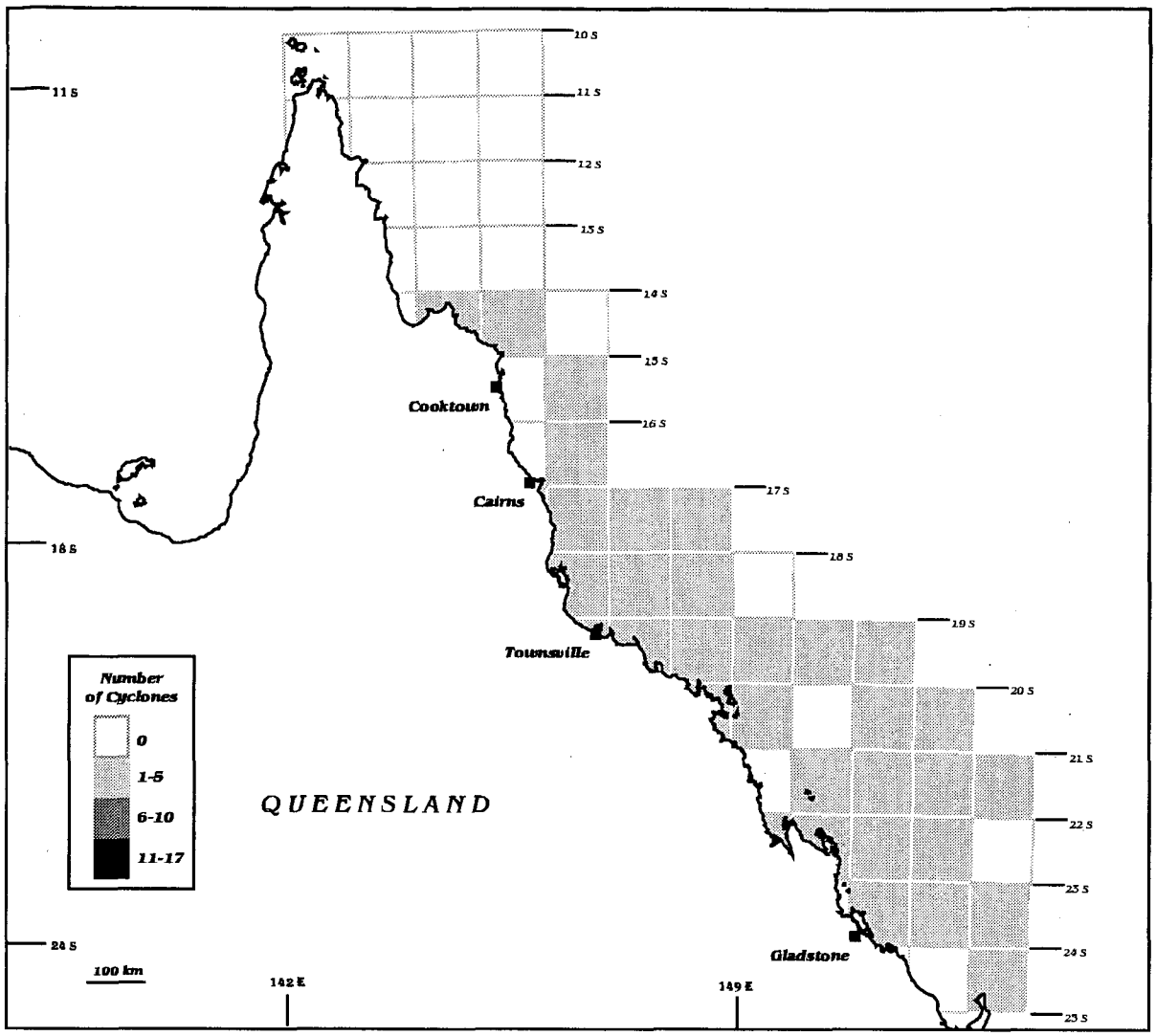


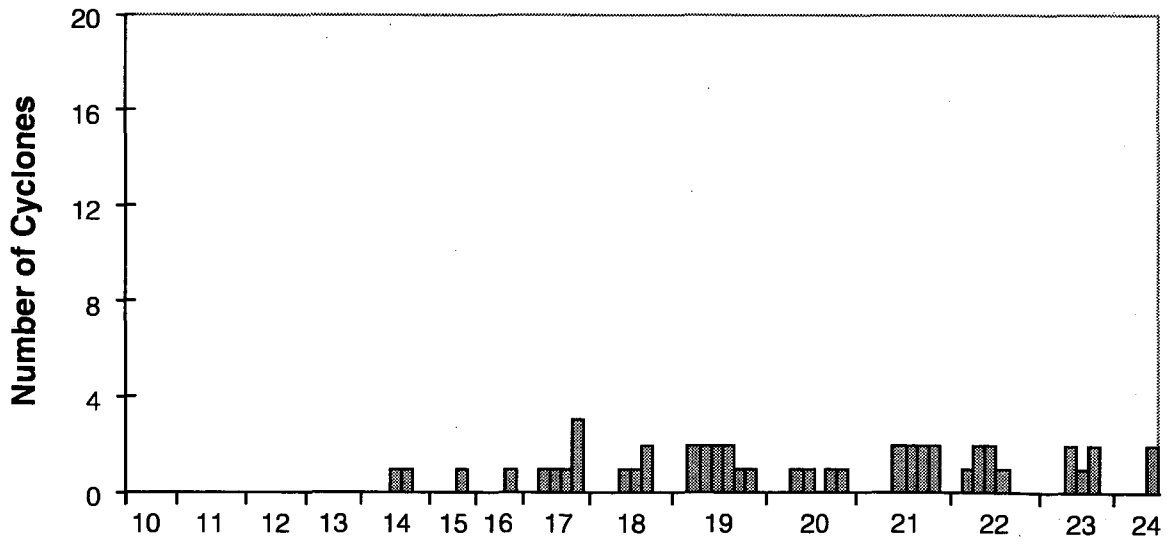
Map 10: *Number of years before 1997 since the last weak (category 0-2) cyclone. Boxes classified as 30+ years have had no weak cyclones pass through them from 1969 to 1997.*



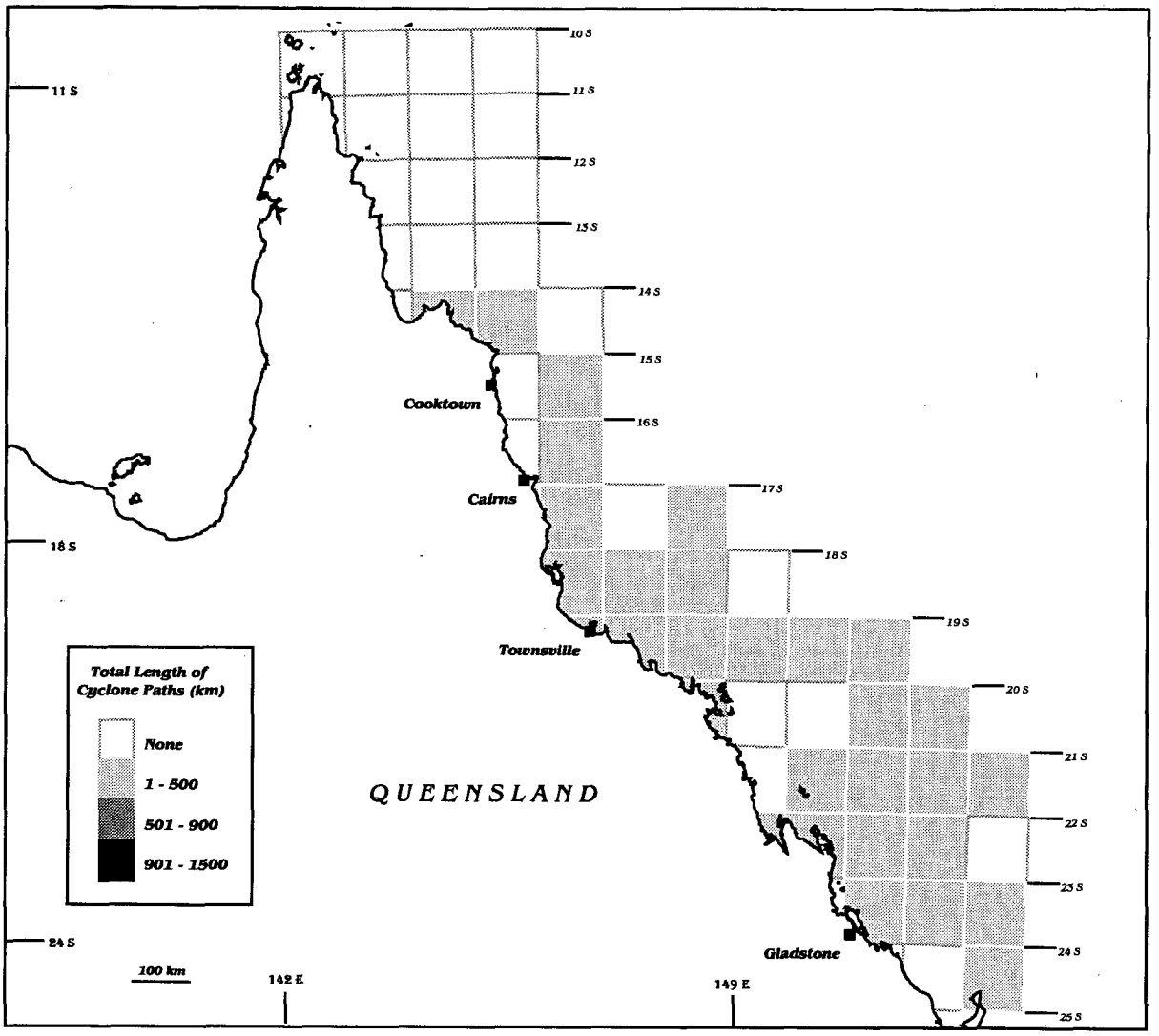


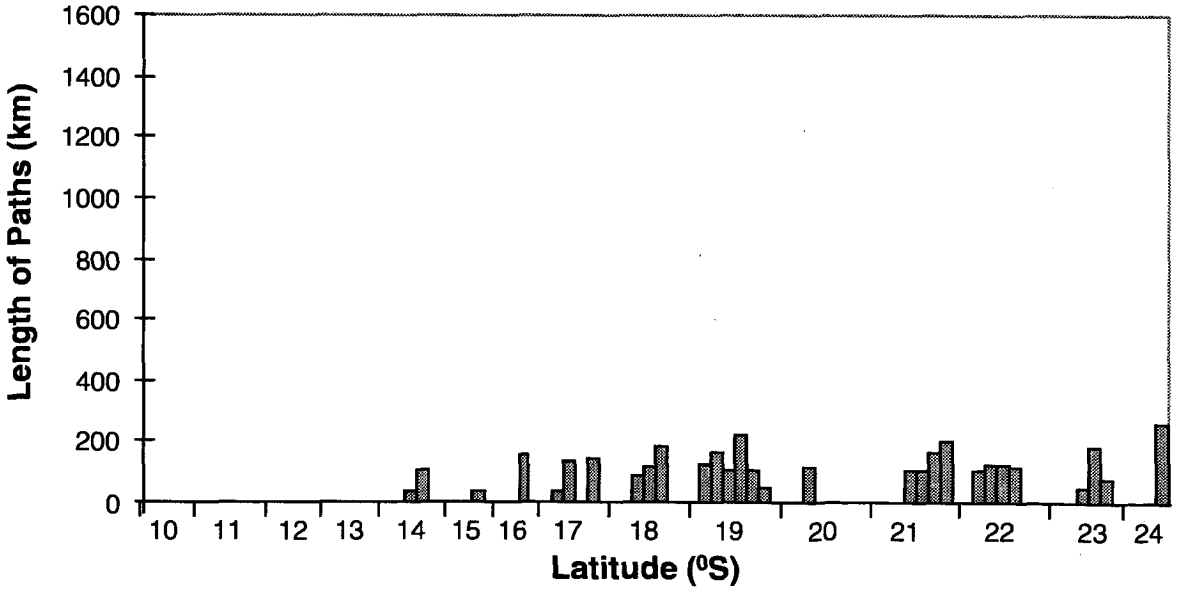
Map 11 : *<u>All strong (categories 3-5) cyclones 1969-1997</u>. The dashed lines represent cyclone paths and shading indicates areas located within 100 km of at least one path. The graphs indicate peaks in the number and total path length of all strong cyclones by latitude.*



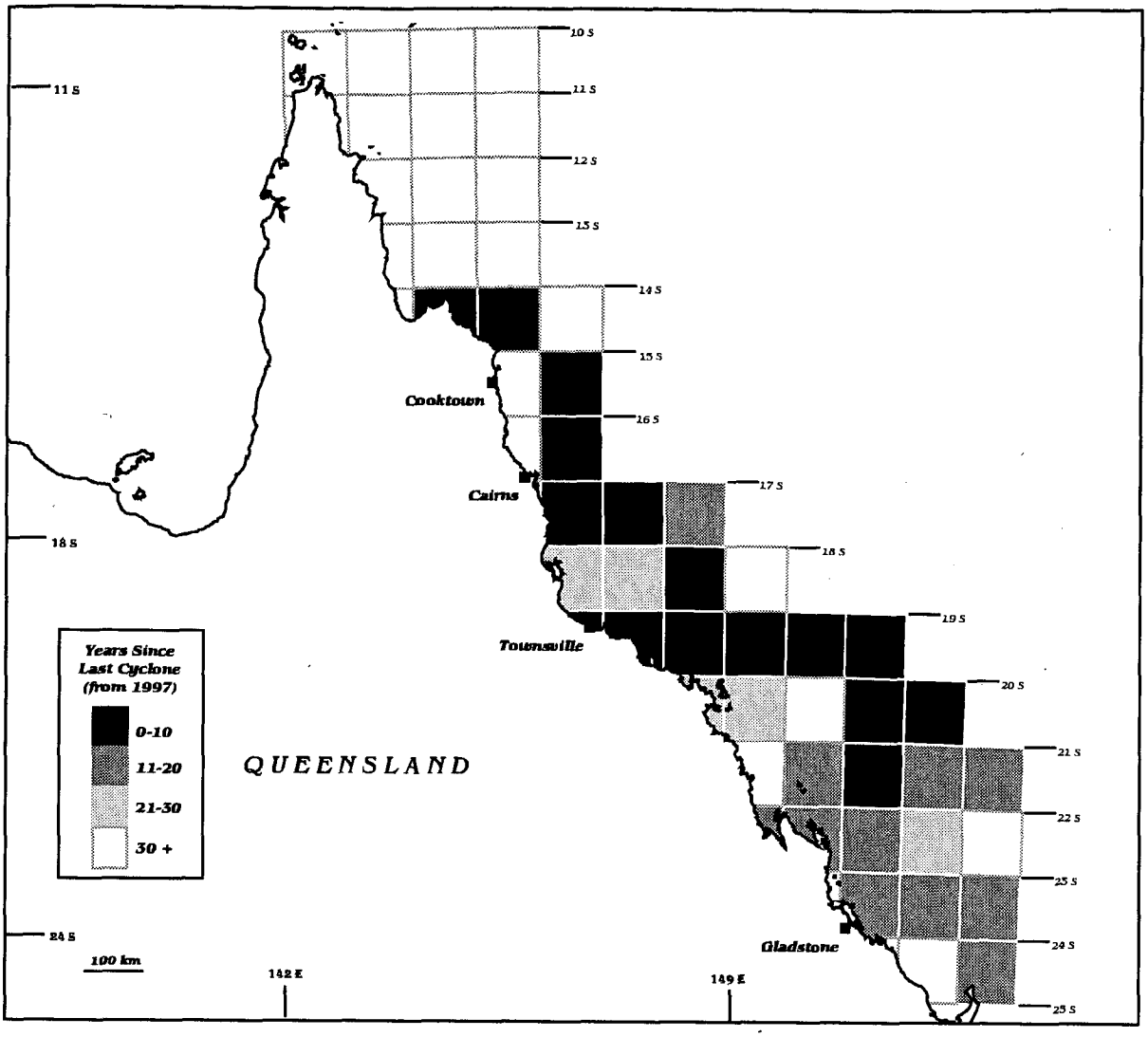


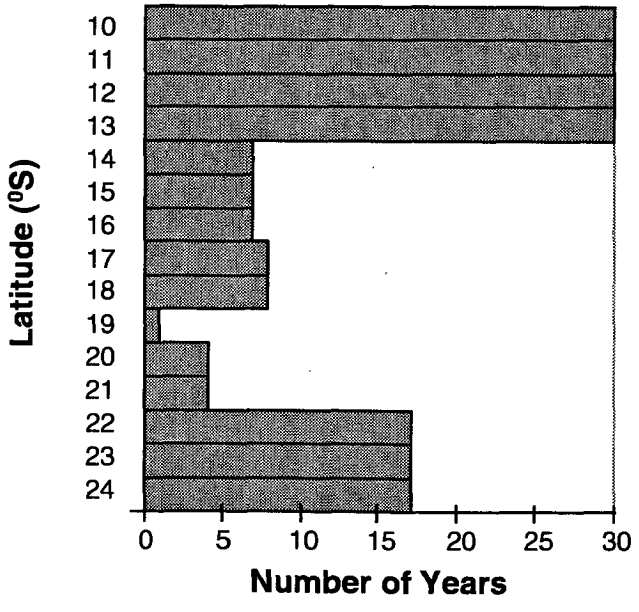
Map 12: *<u>All strong (categories 3-5) cyclones 1969-1997: number of cyclones</u>. Seperate bars for each latitude depict the values for each 1^0 latitude by 1^0 longitude box.*



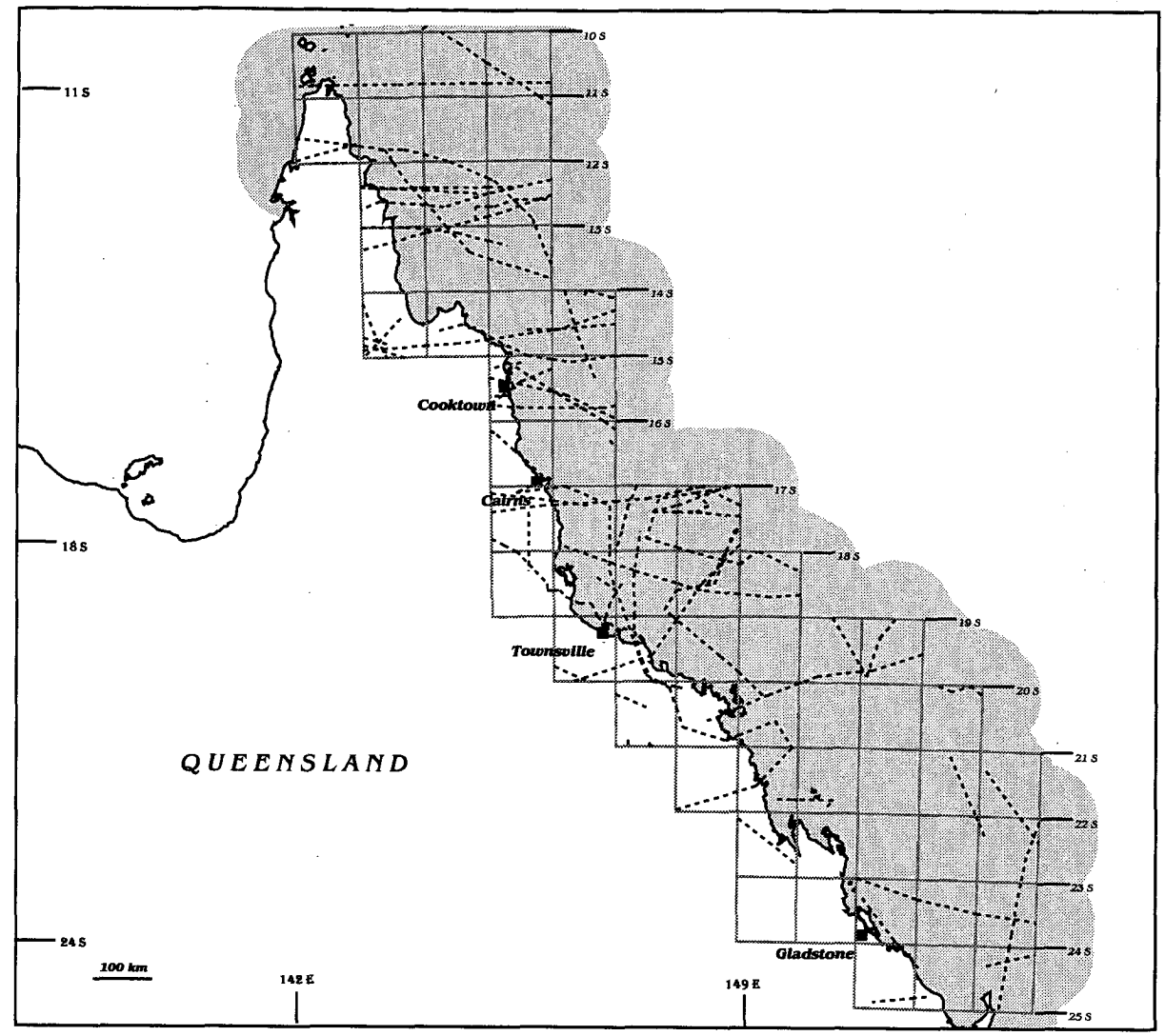


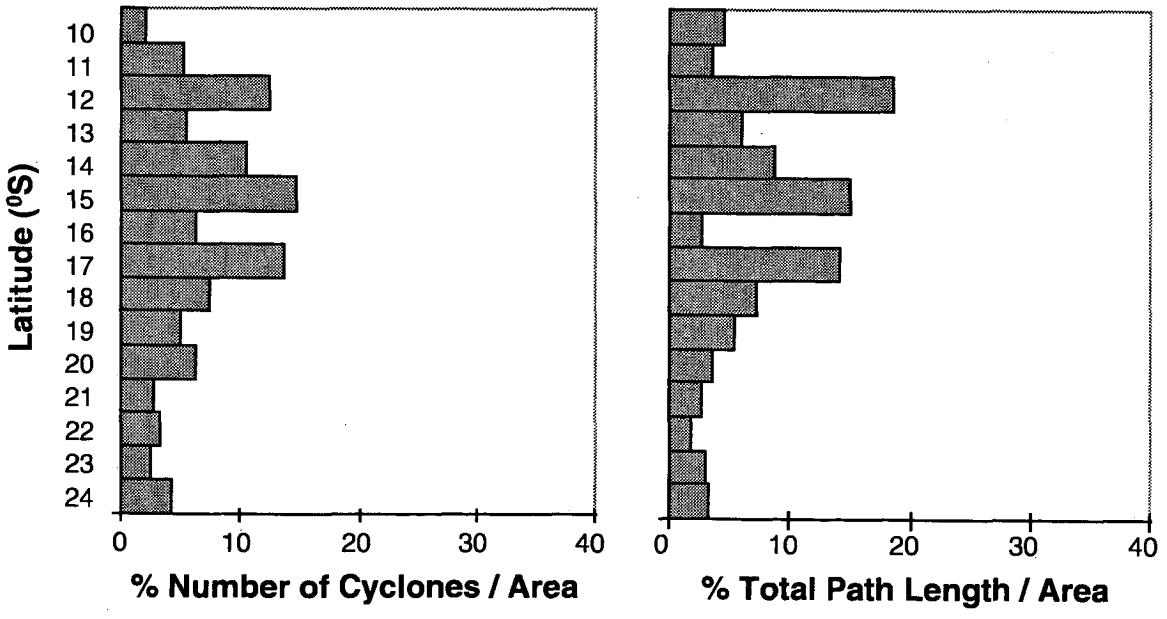
Map 13: *<u>All strong (categories 3-5) cyclones 1969-1997: total length of cyclone paths</u>. Seperate bars for each latitude depict the values for each 1^0 latitude by 1^0 longitude box.*



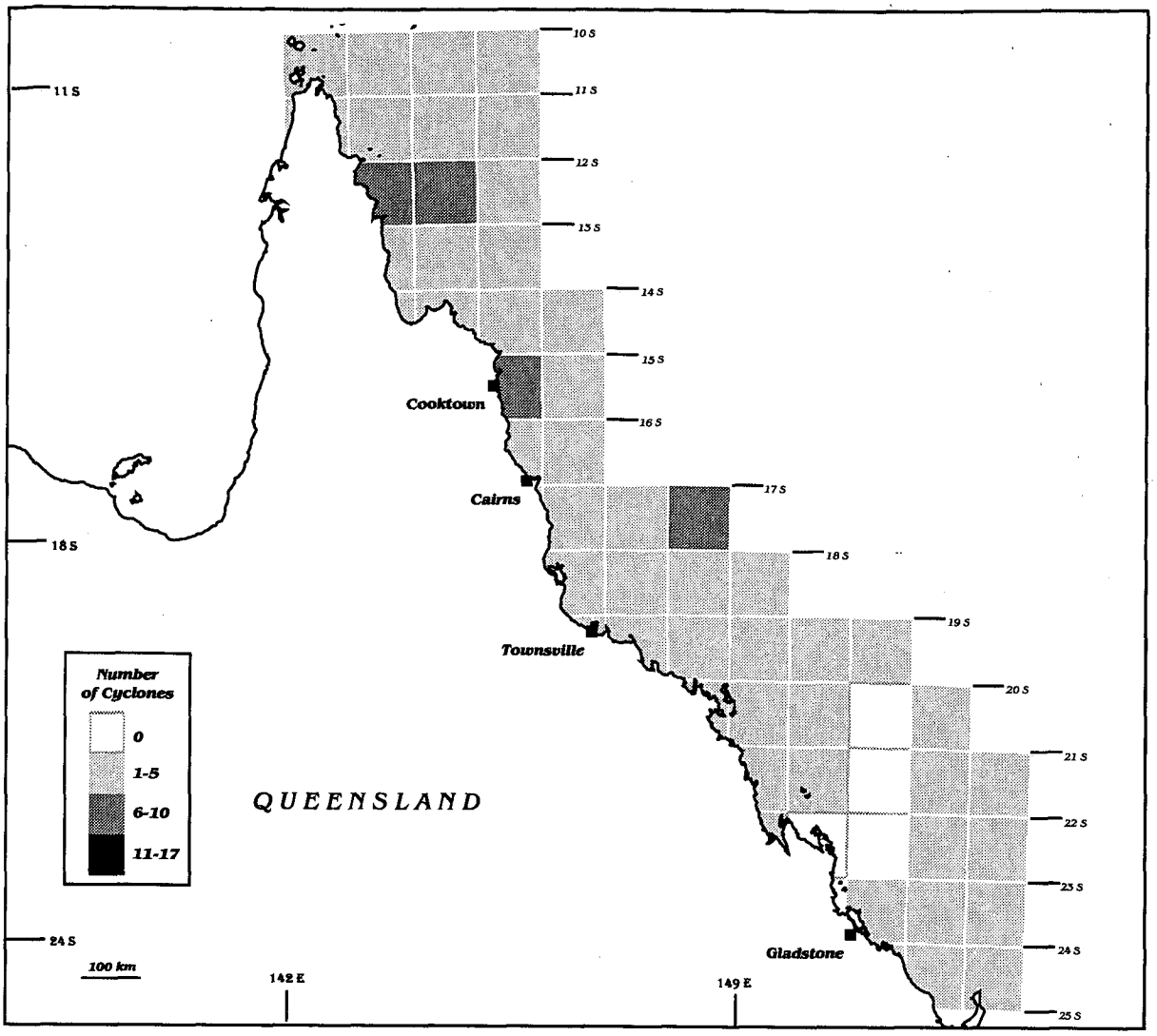


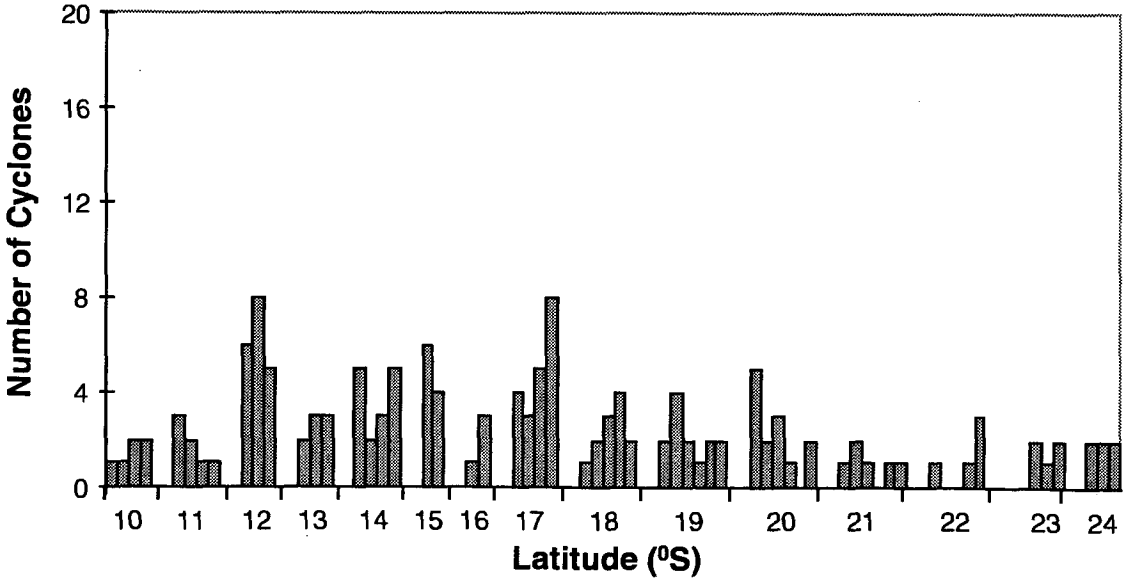
Map 14 : *Number of years before 1997 since the last strong (categories 3-5) cyclone. Boxes classified as 30+ years have had no strong cyclones pass through them from 1969 to 1997.*



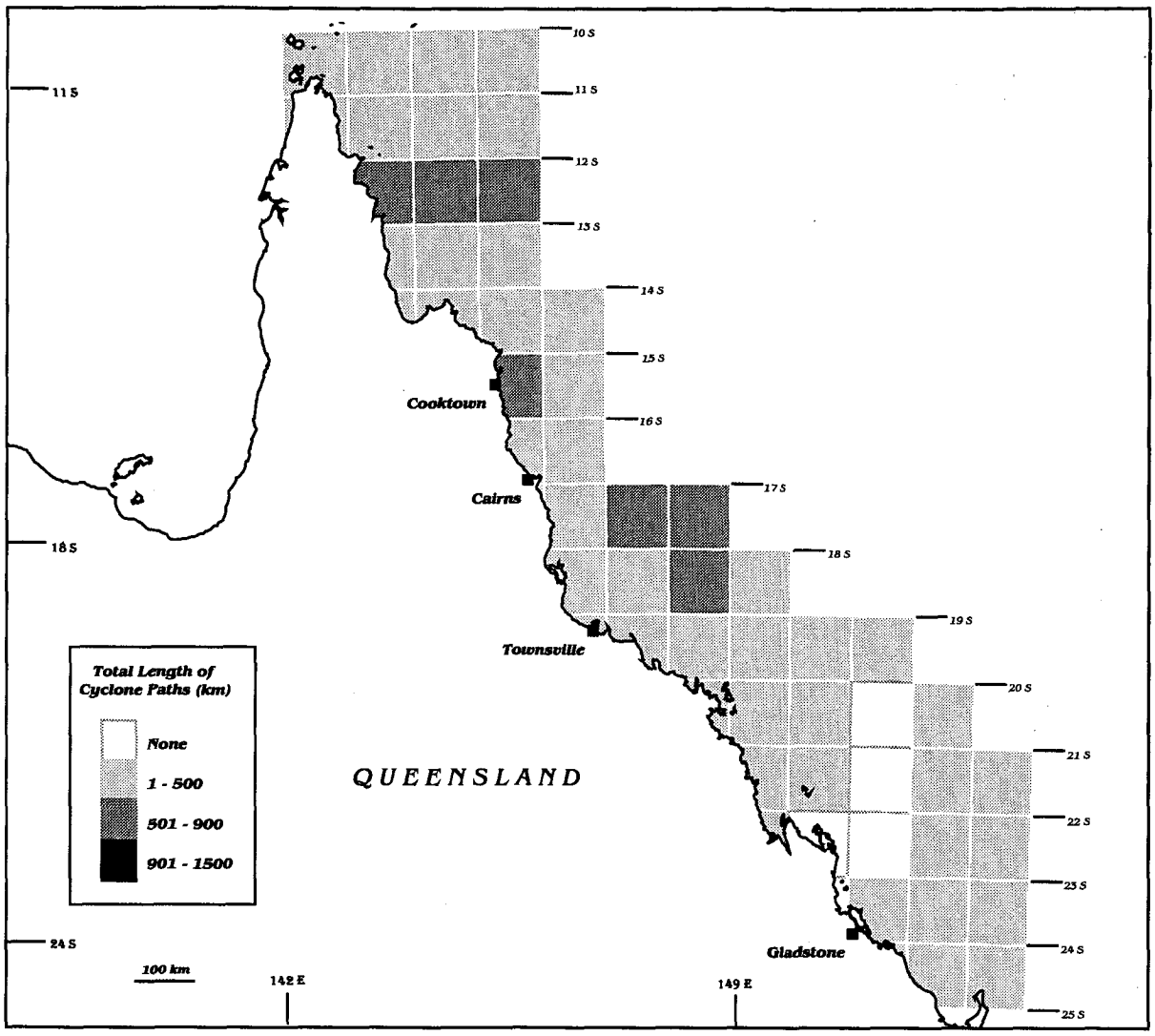


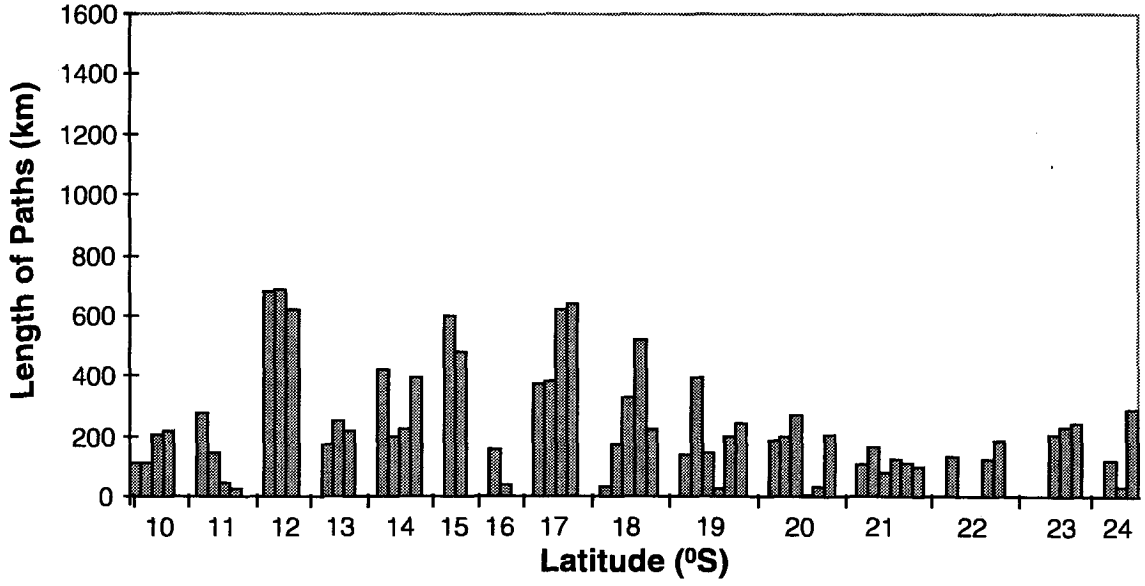
Map 15: *Category 0 cyclones 1969-1997. Dashed lines represent cyclone paths and shading indicates areas within 100 km of at least one path. The graphs indicate peaks in the number and total path length of category 0 cyclones by latitude.*



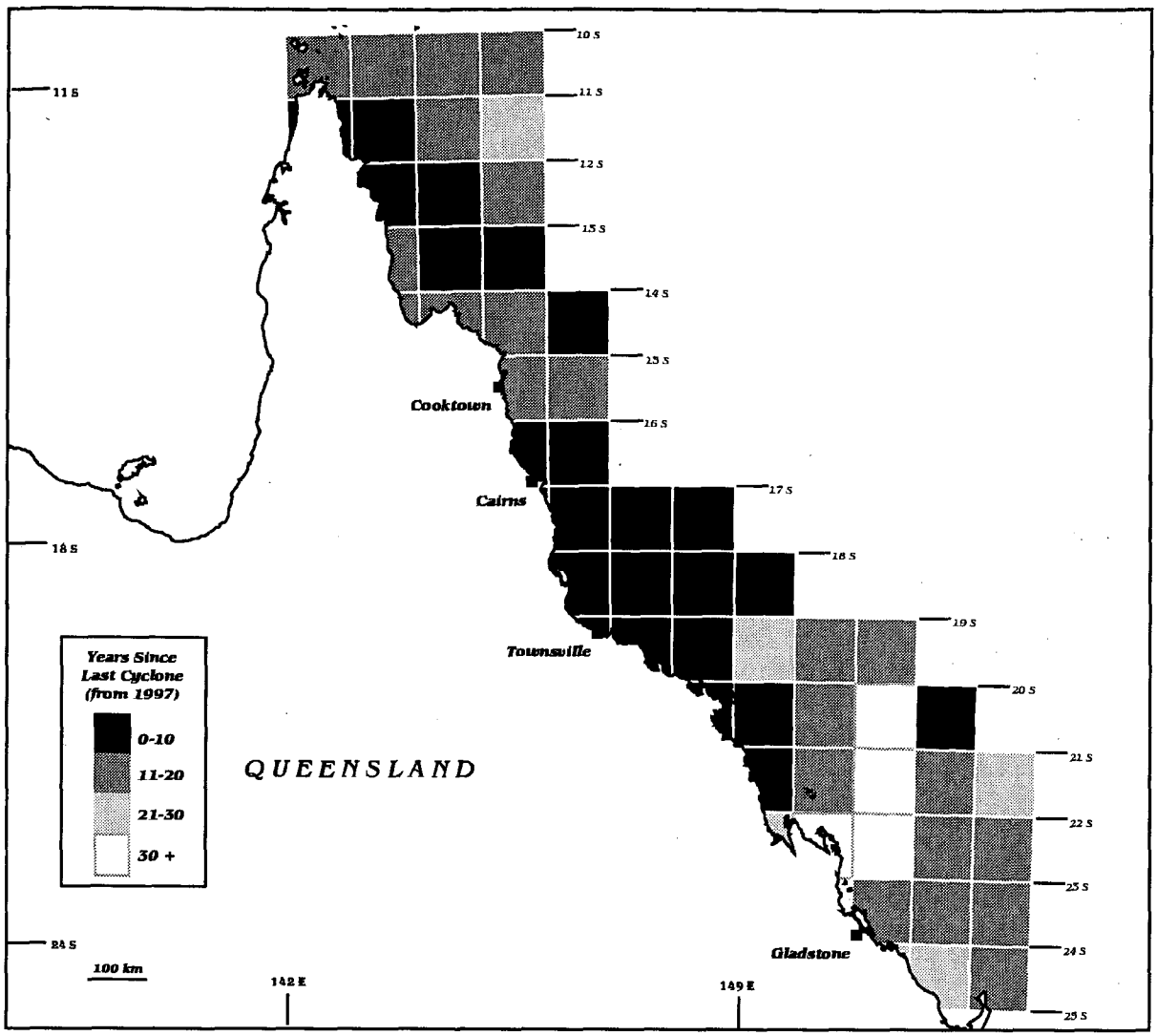


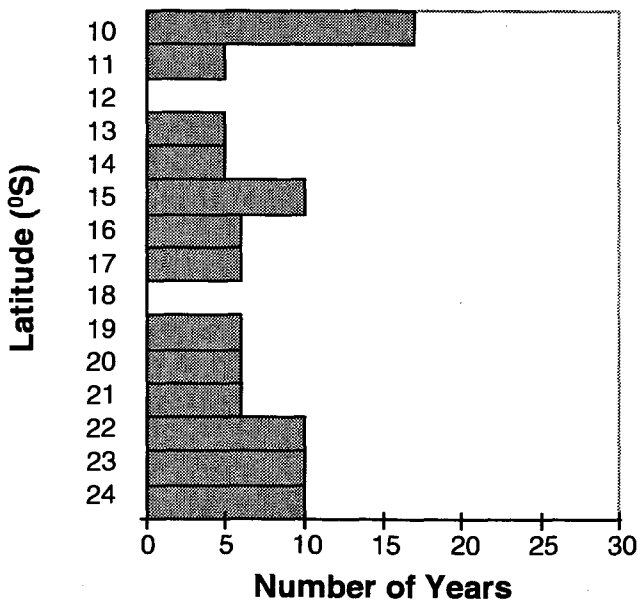
Map 16: *Category 0 cyclones 1969-1997: number of cyclones. Seperate bars for each latitude depict the values for each 1^0 latitude by 1^0 longitude box.*



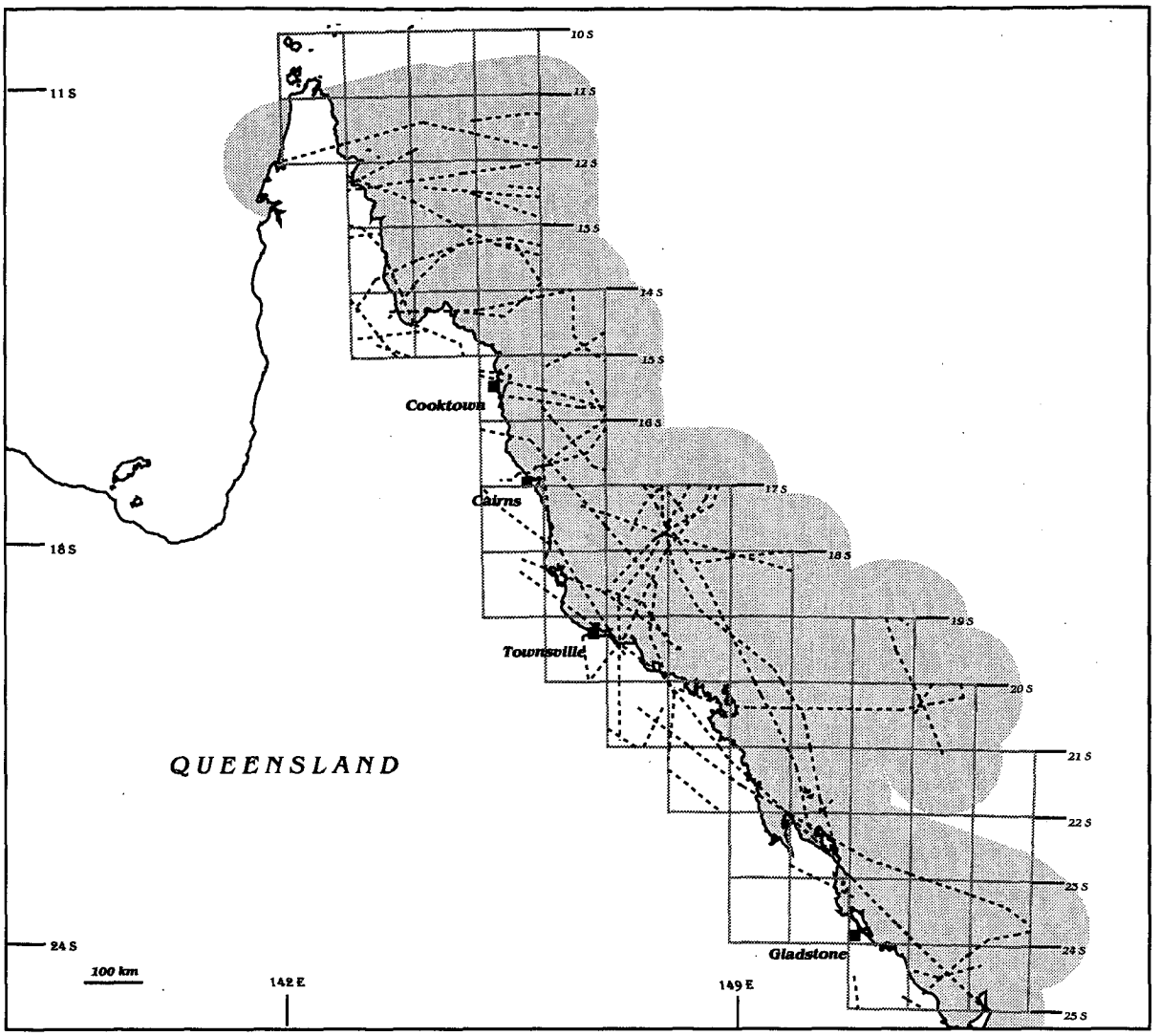


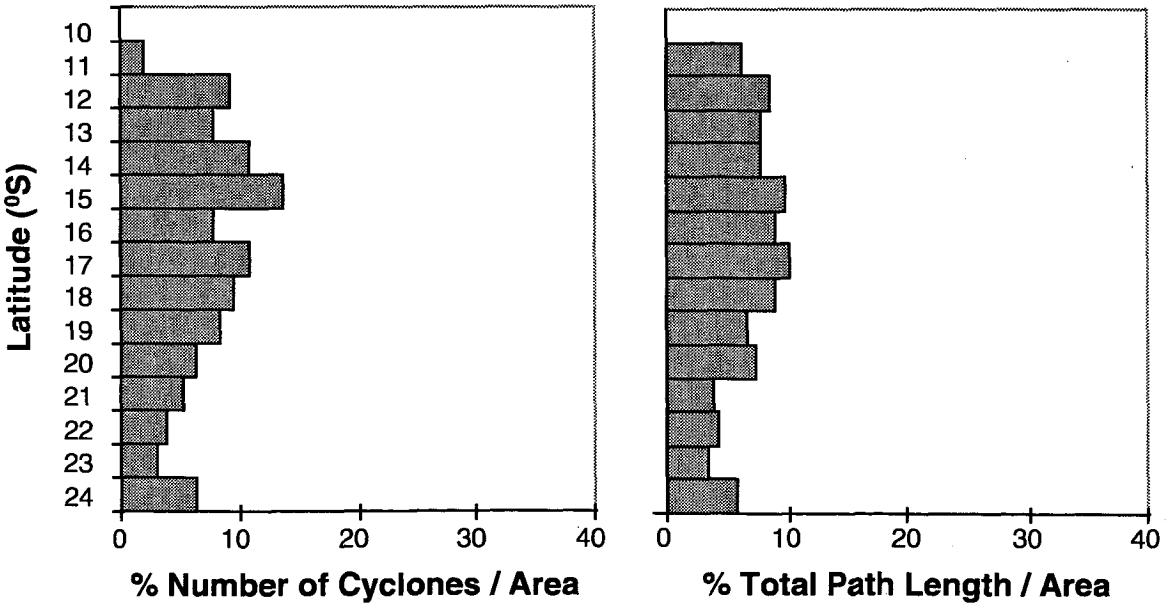
Map 17: *Category 0 cyclones 1969-1997: total length of cyclone paths. Seperate bars for each latitude depict the values for each 1^0 latitude by 1^0 longitude box.*



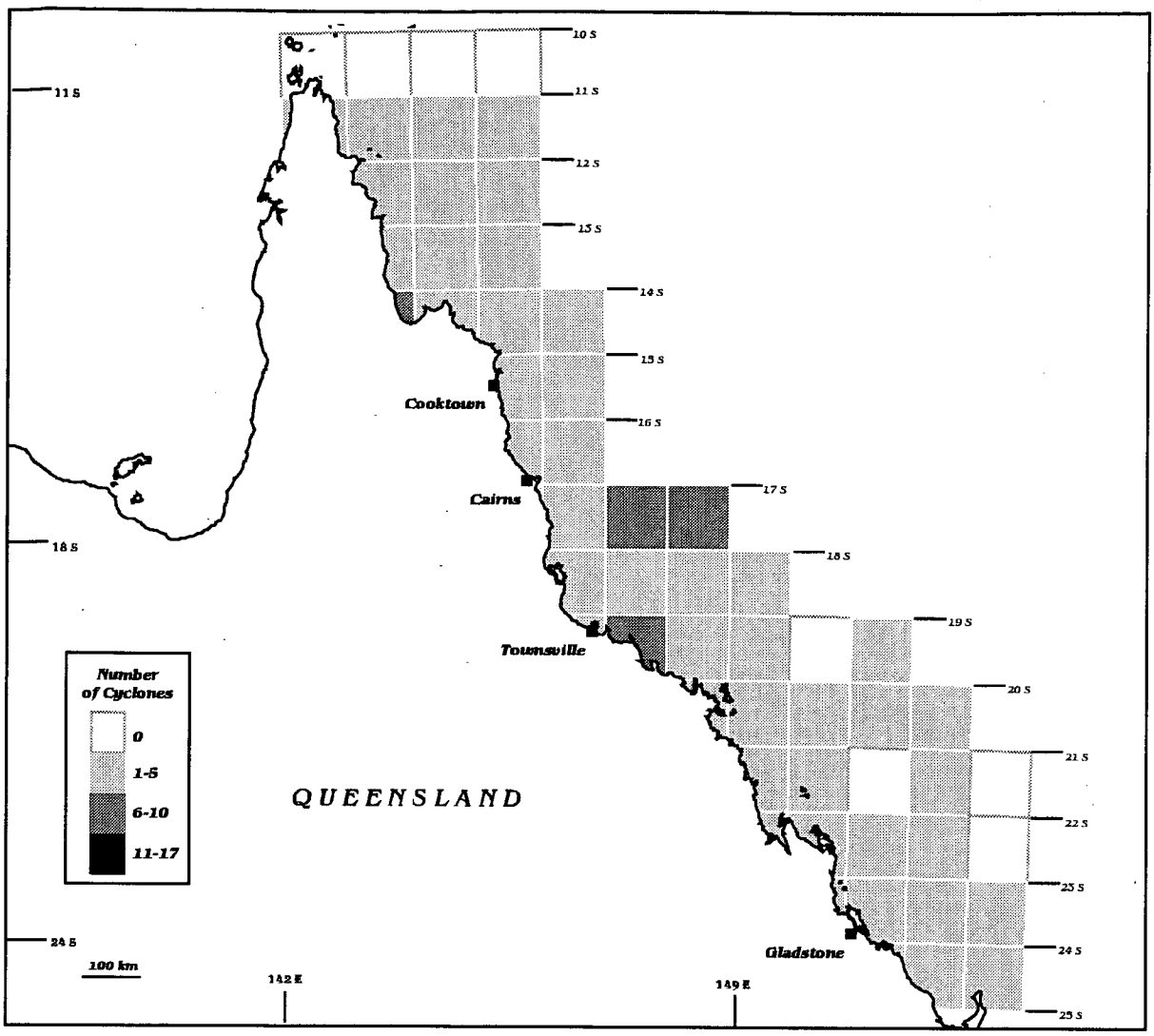


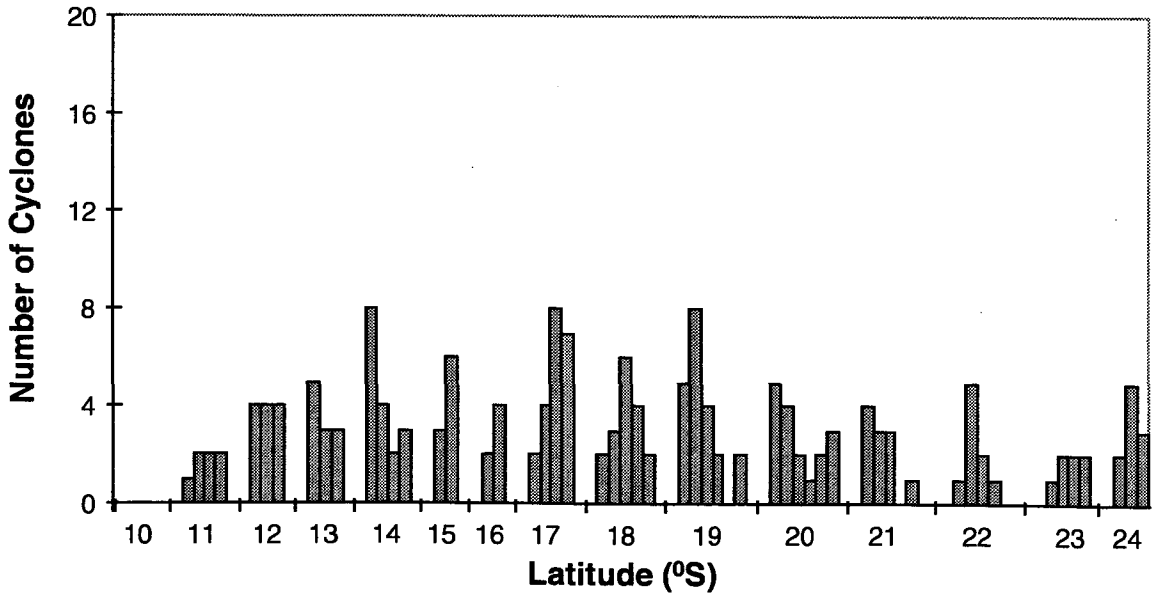
Map 18 : *Number of years before 1997 since the last category 0 cyclone. Boxes classified as 30+ years have had no category 0 cyclones pass through them from 1969 to 1997.*



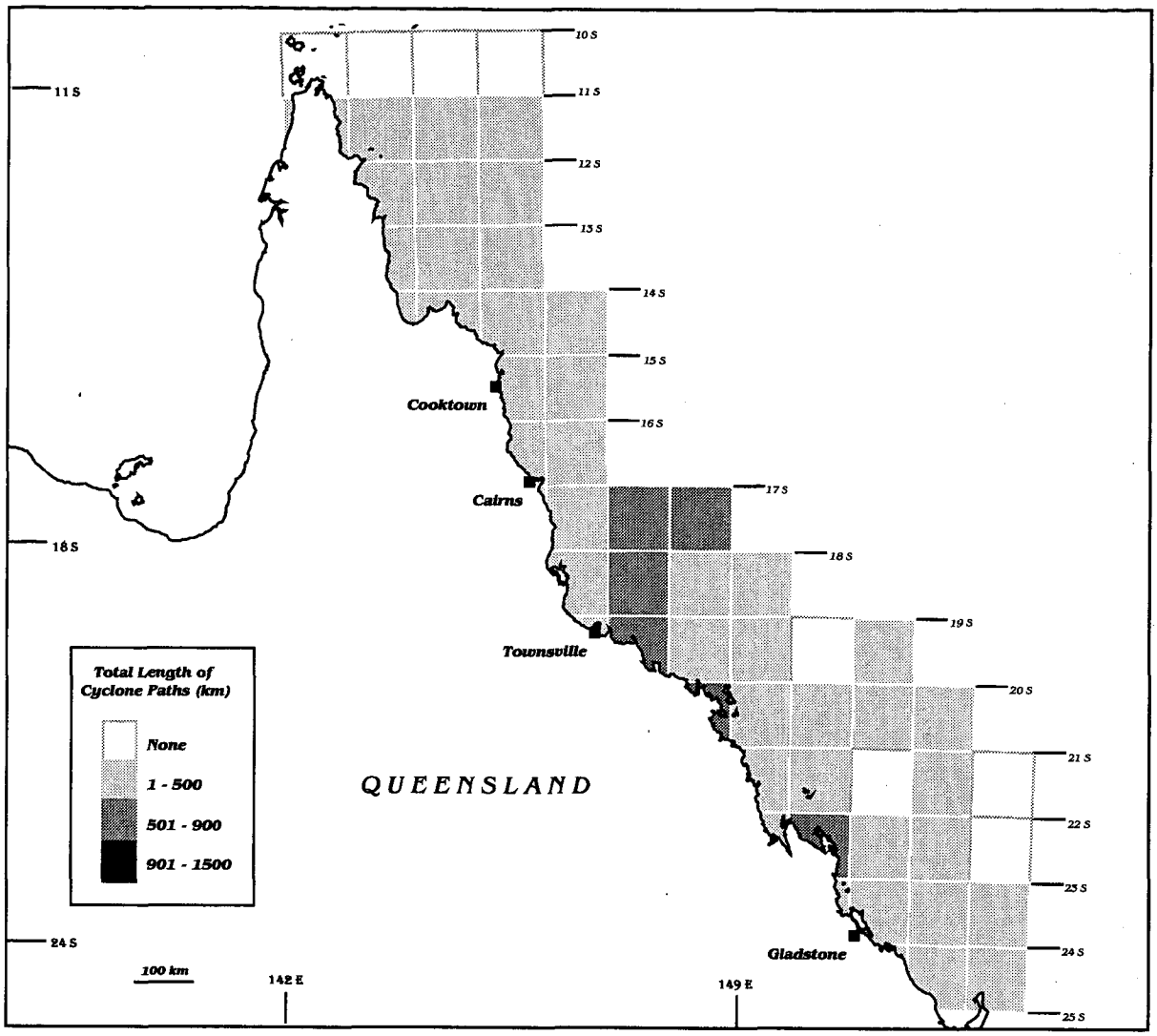


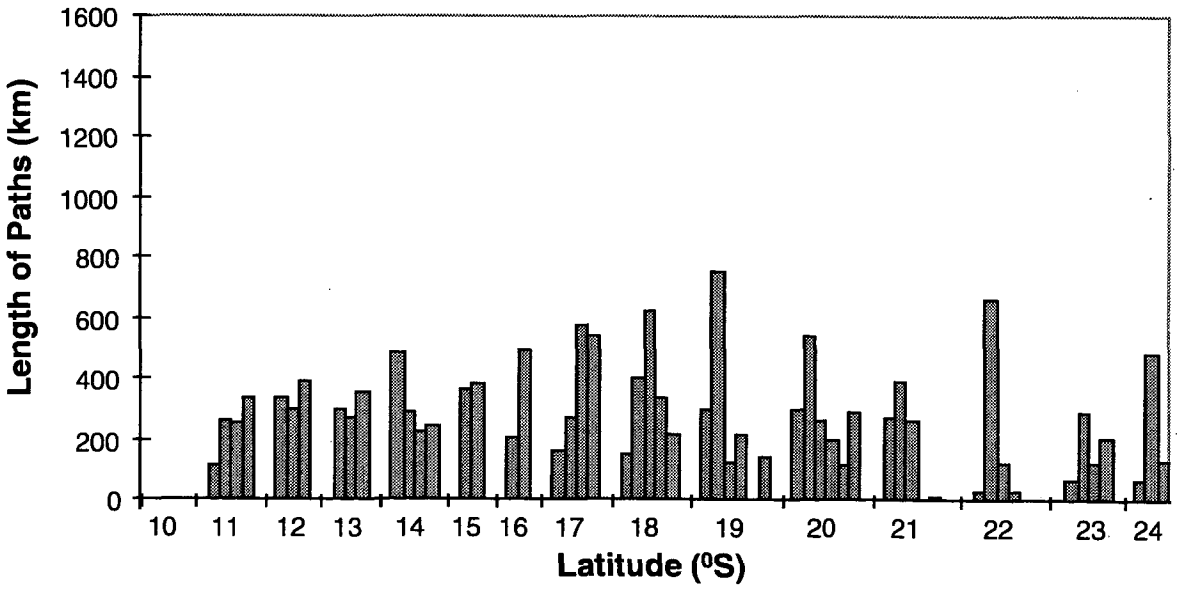
Map 19: *Category 1 cyclones1969-1997. Dashed lines represent cyclone paths and shading indicates areas within 100 km of at least one path. The graphs indicate peaks in the number and total path length of category 1 cyclones by latitude.*



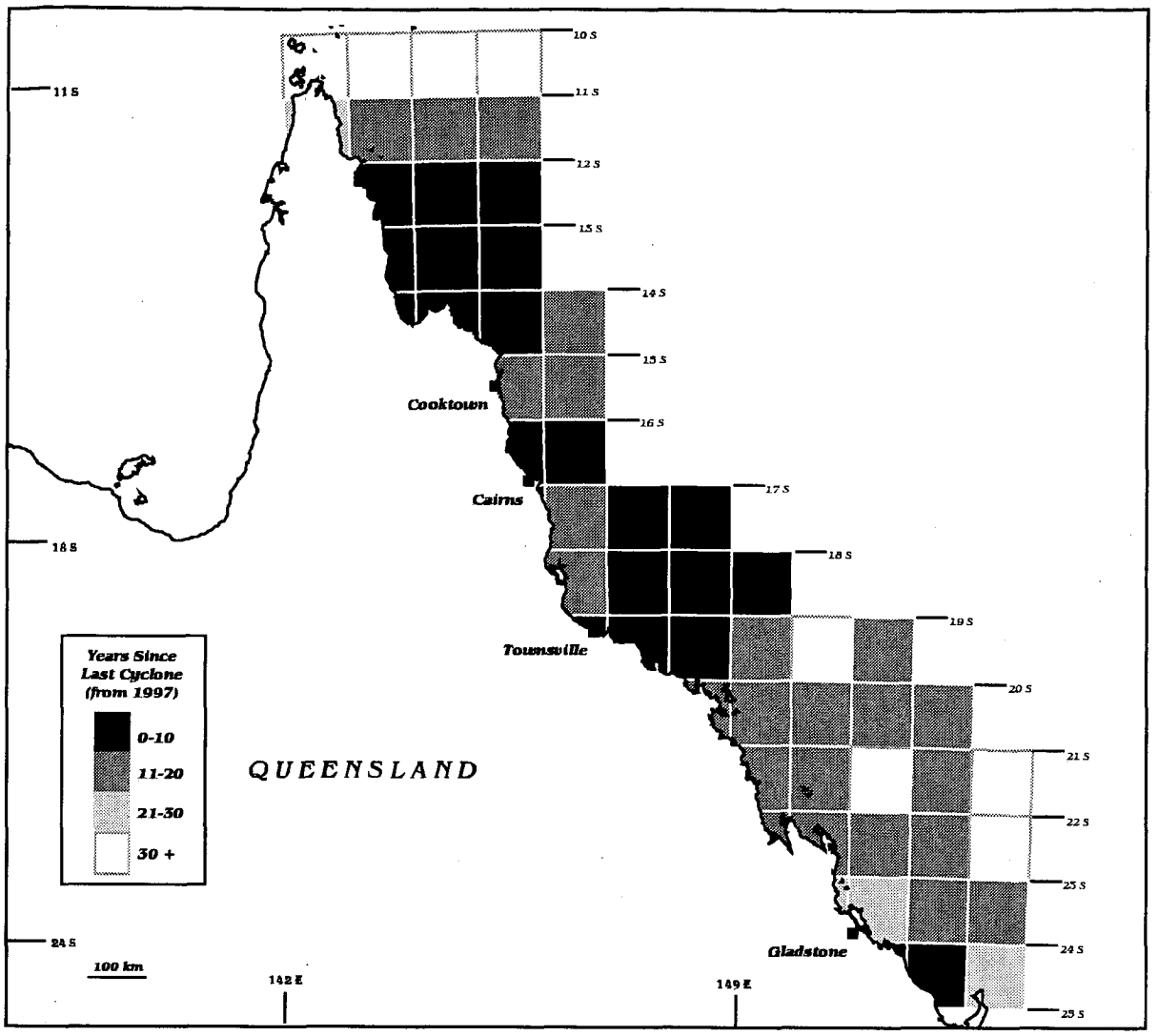


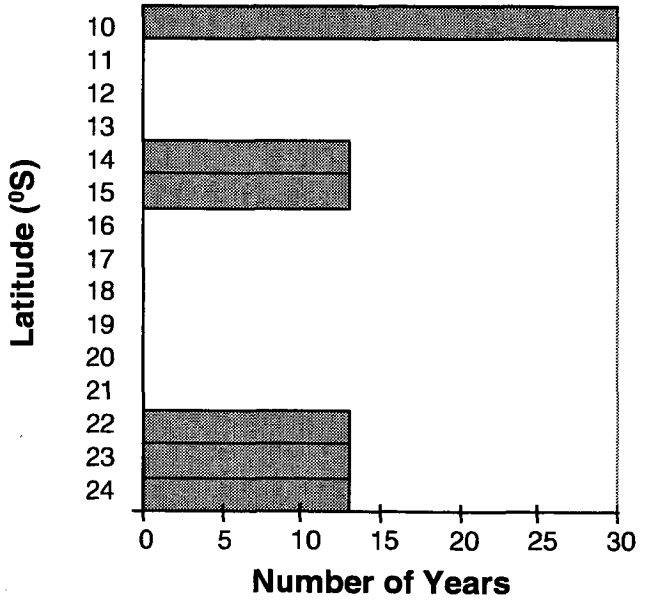
Map 20: *Category 1 cyclones 1969-1997: number of cyclones. Seperate bars for each latitude depict the values for each 1^0 latitude by 1^0 longitude box.*



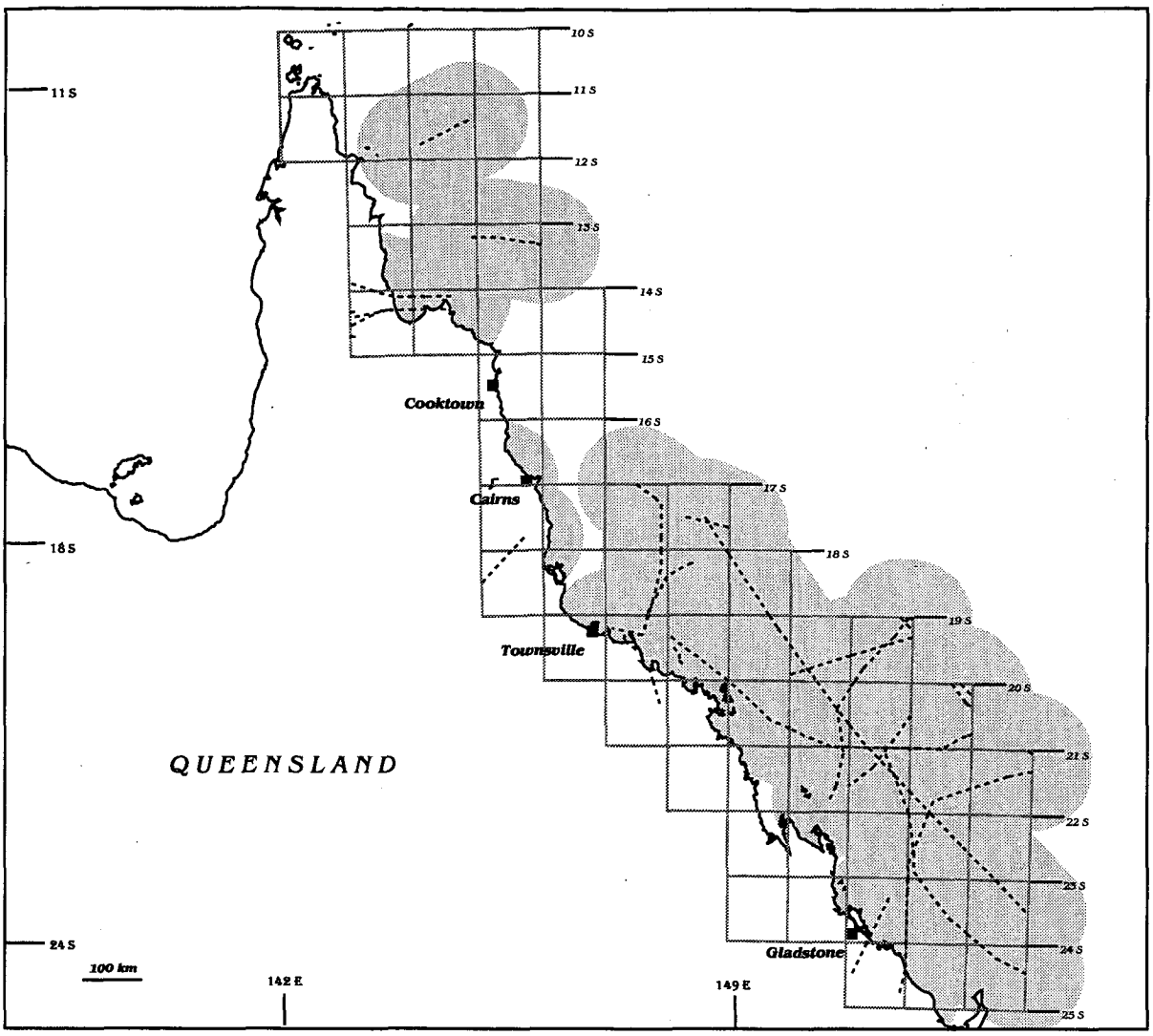


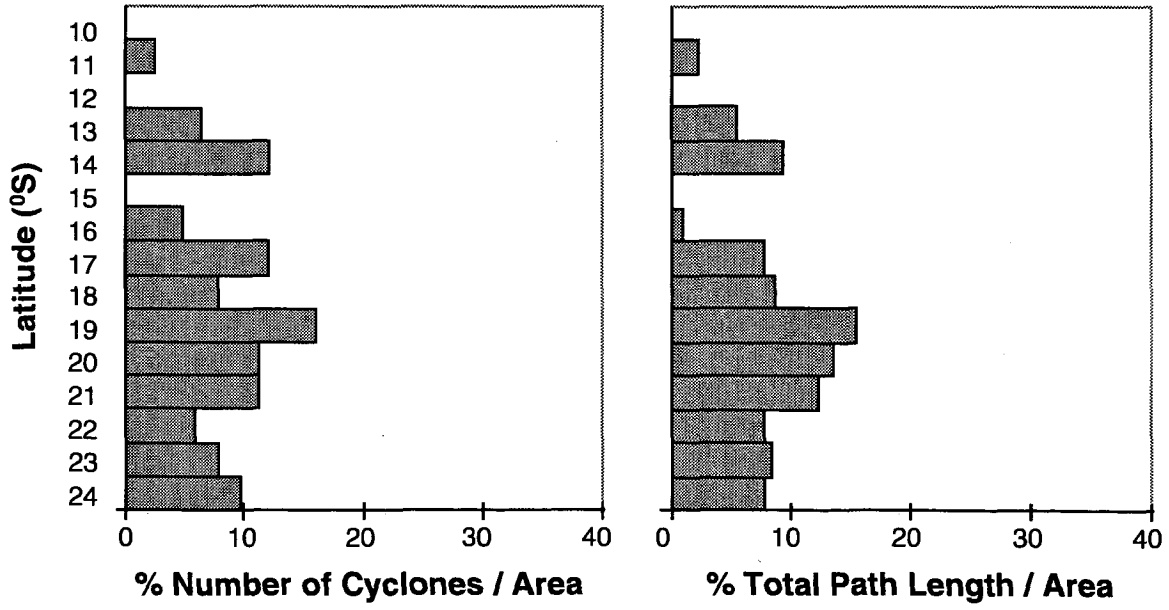
Map 21: *Category 1 cyclones 1969-1997: total length of cyclone paths. Seperate bars for each latitude depict the values for each 1^0 latitude by 1^0 longitude box.*



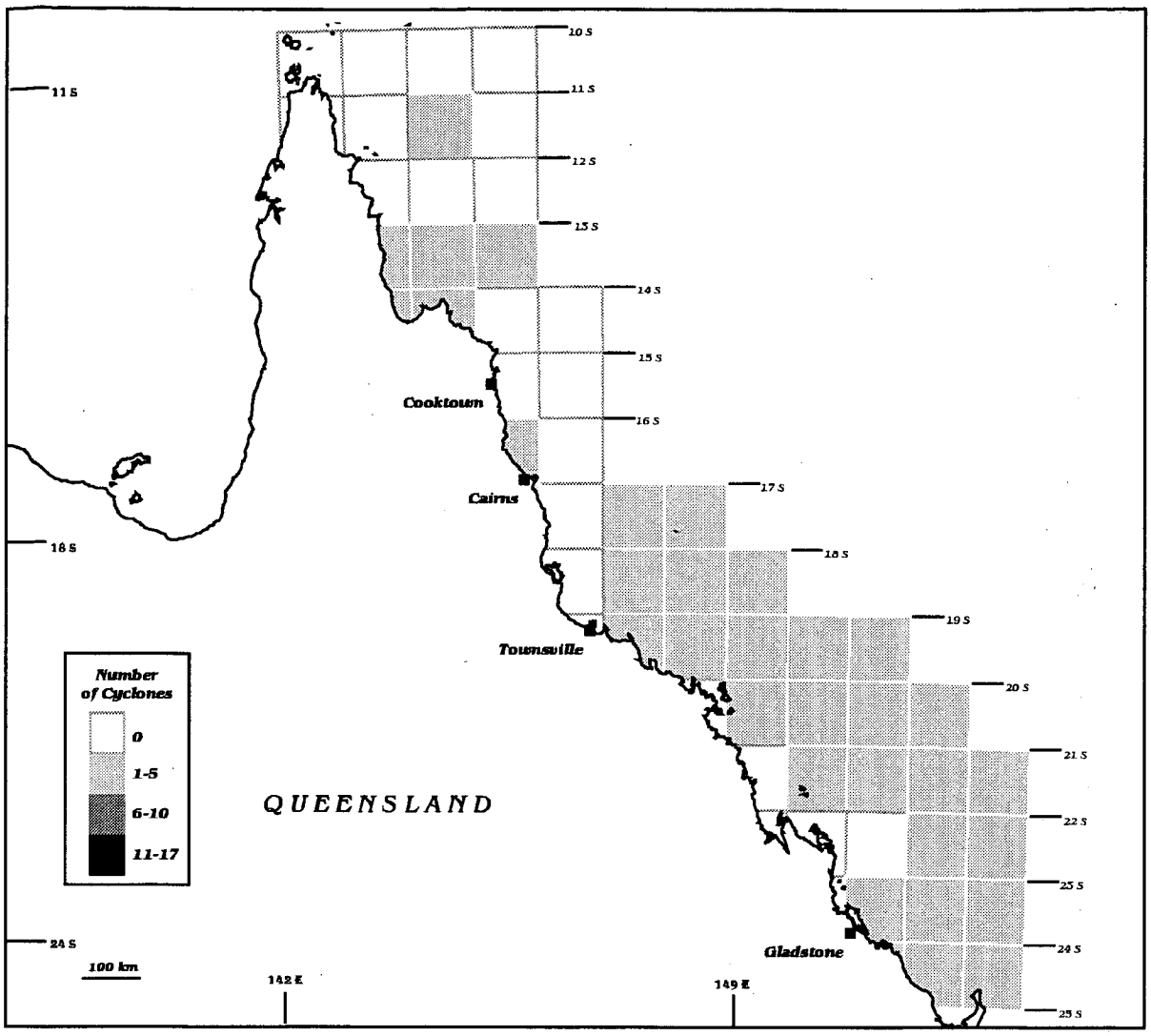


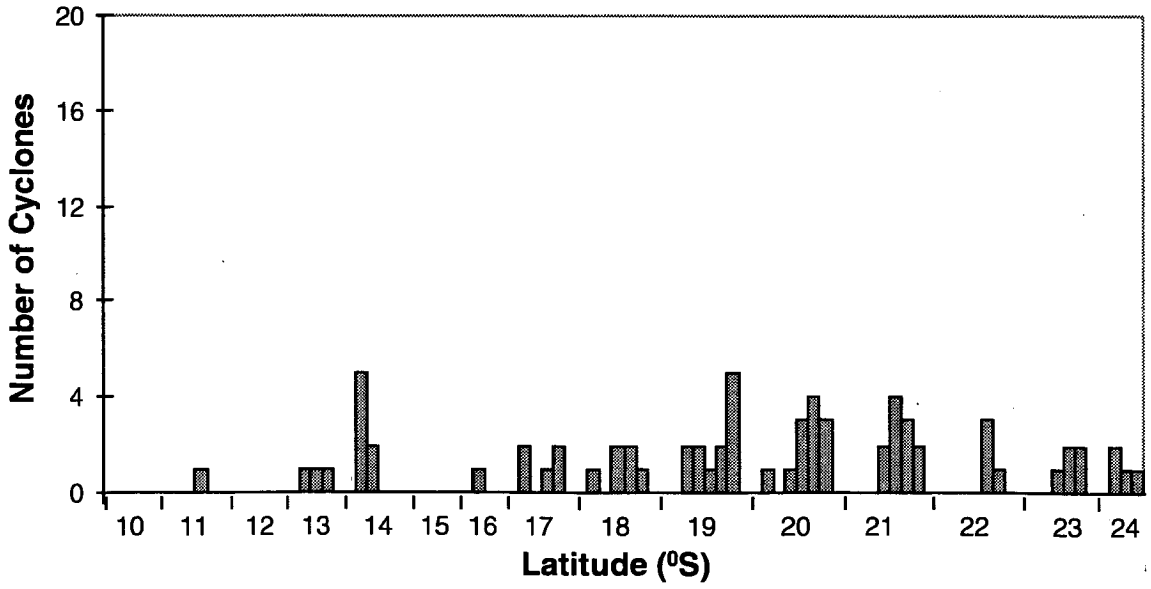
Map 22: *Number of years before 1997 since the last category 1 cyclone. Boxes classified as 30+ years have had no catgory 1 cyclones pass through them from 1969 to 1997.*



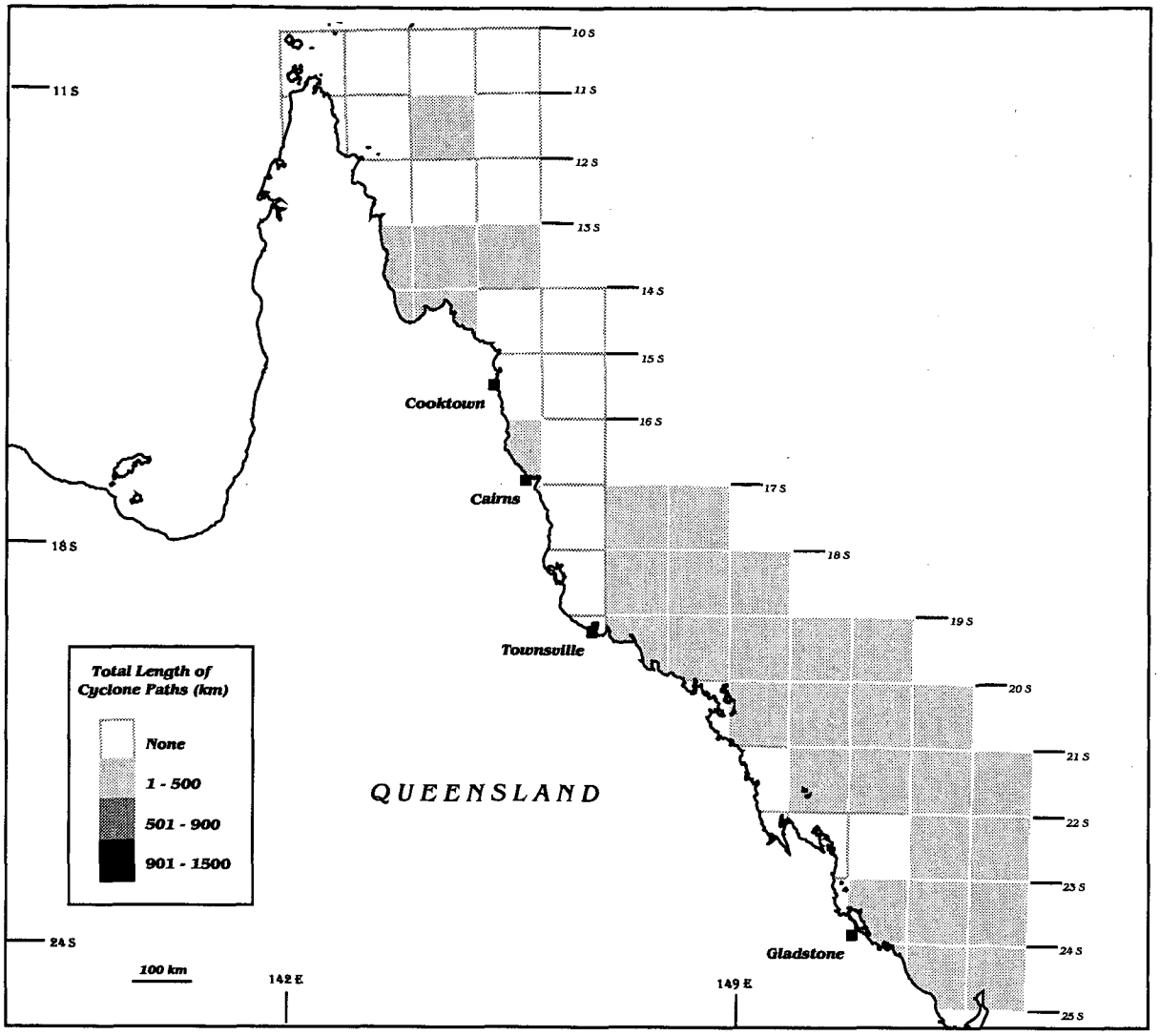


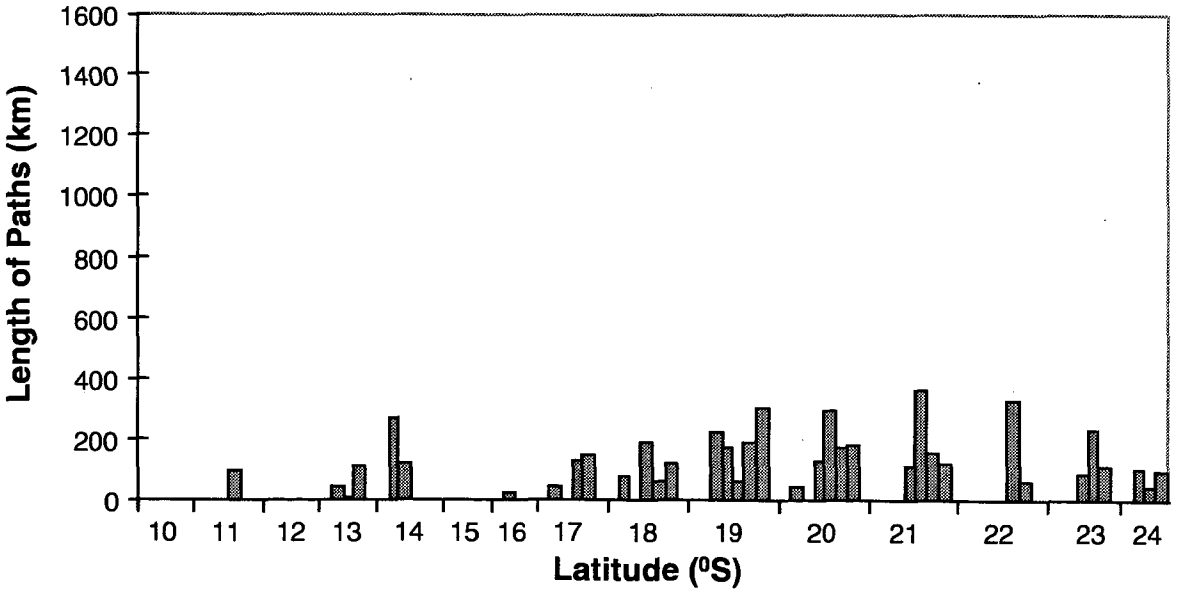
Map 23: *Category 2 cyclones 1969-1997. Dashed lines represent cyclone paths and shading indicates areas located within 100 km of at least one path. The graphs indicate peaks in the number and total path length of category 2 cyclones by latitude.*



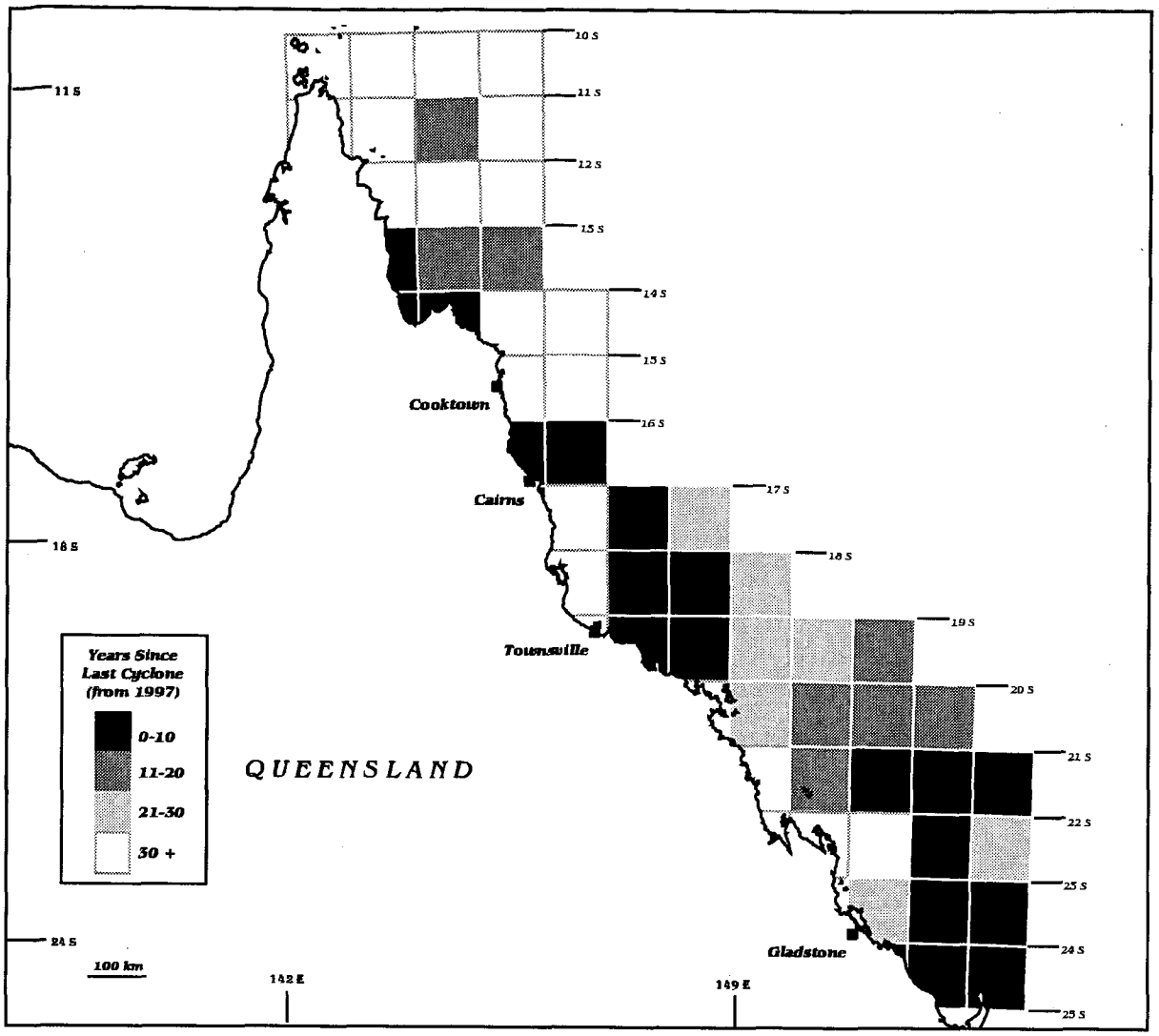


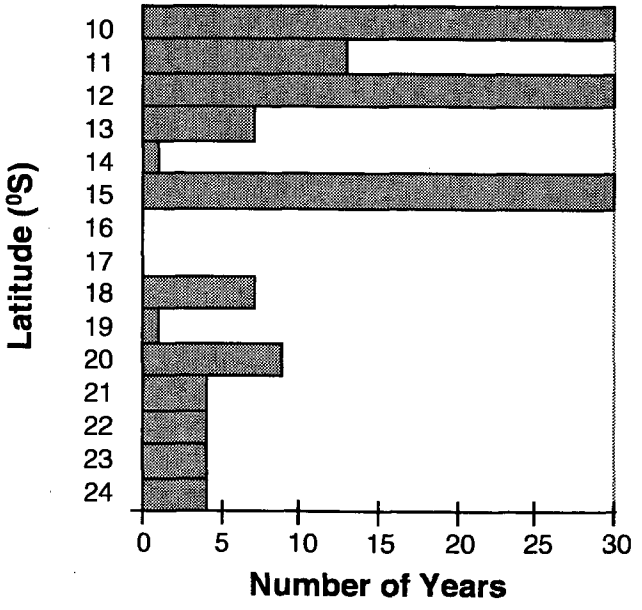
Map 24: *Category 2 cyclones 1969-1997: number of cyclones. Seperate bars for each latitude depict the values for each 1^0 latitude by 1^0 longitude box.*



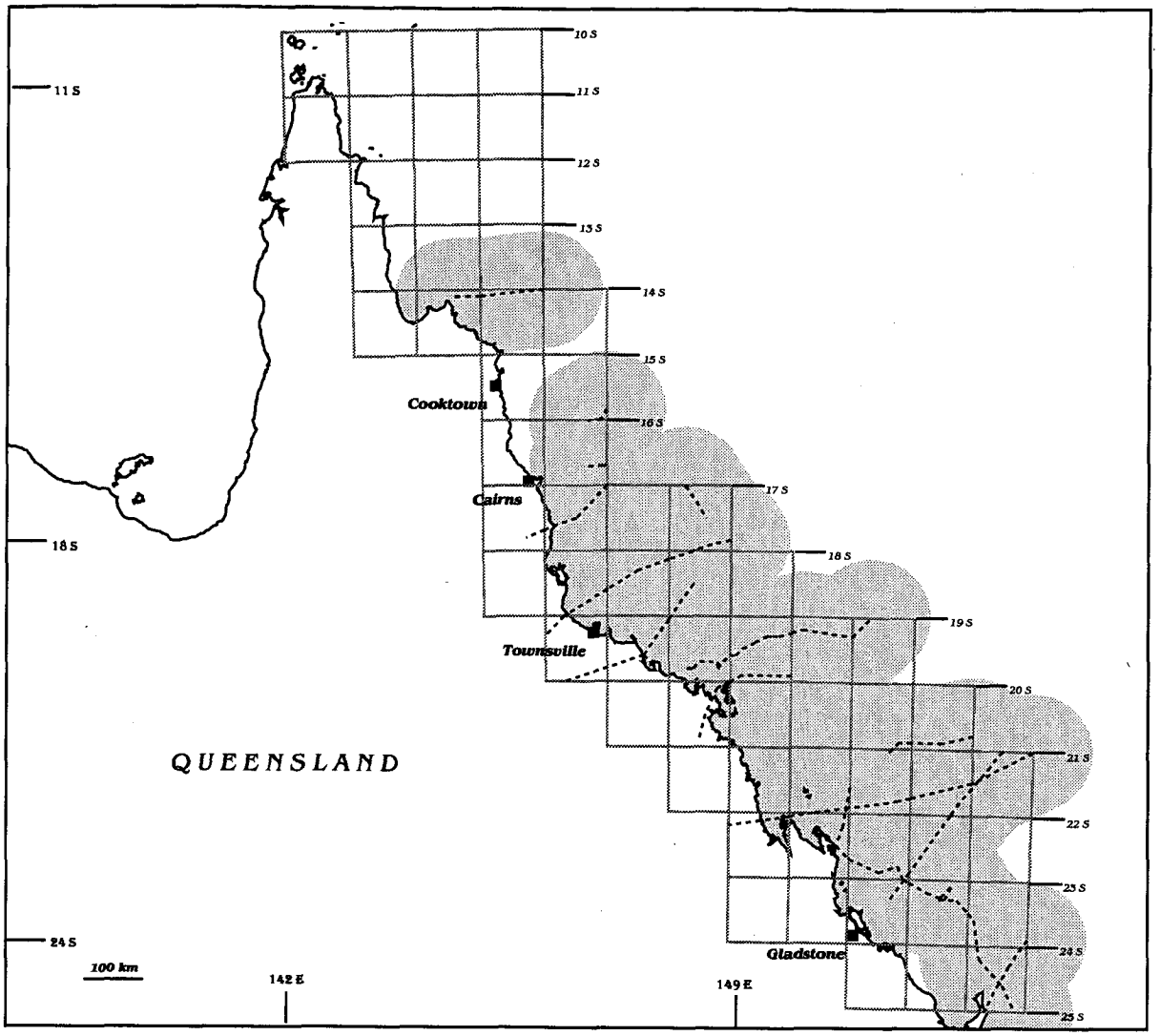


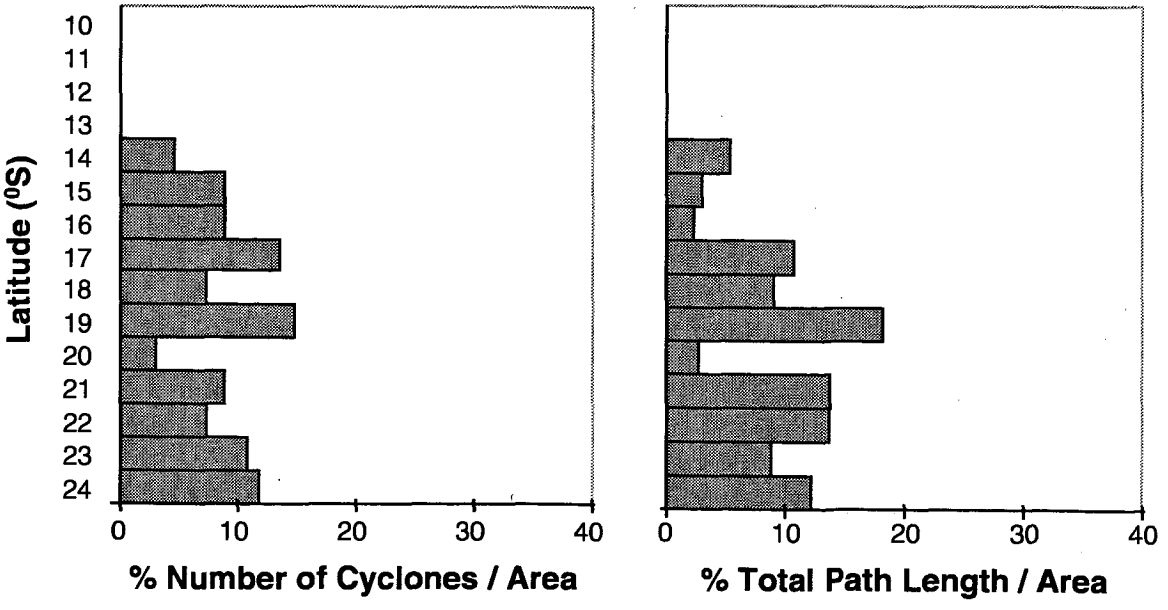
Map 25: *Category 2 cyclones 1969-1997: total length of cyclone paths. Seperate bars for each latitude depict the values for each 1^0 latitude by 1^0 longitude box.*



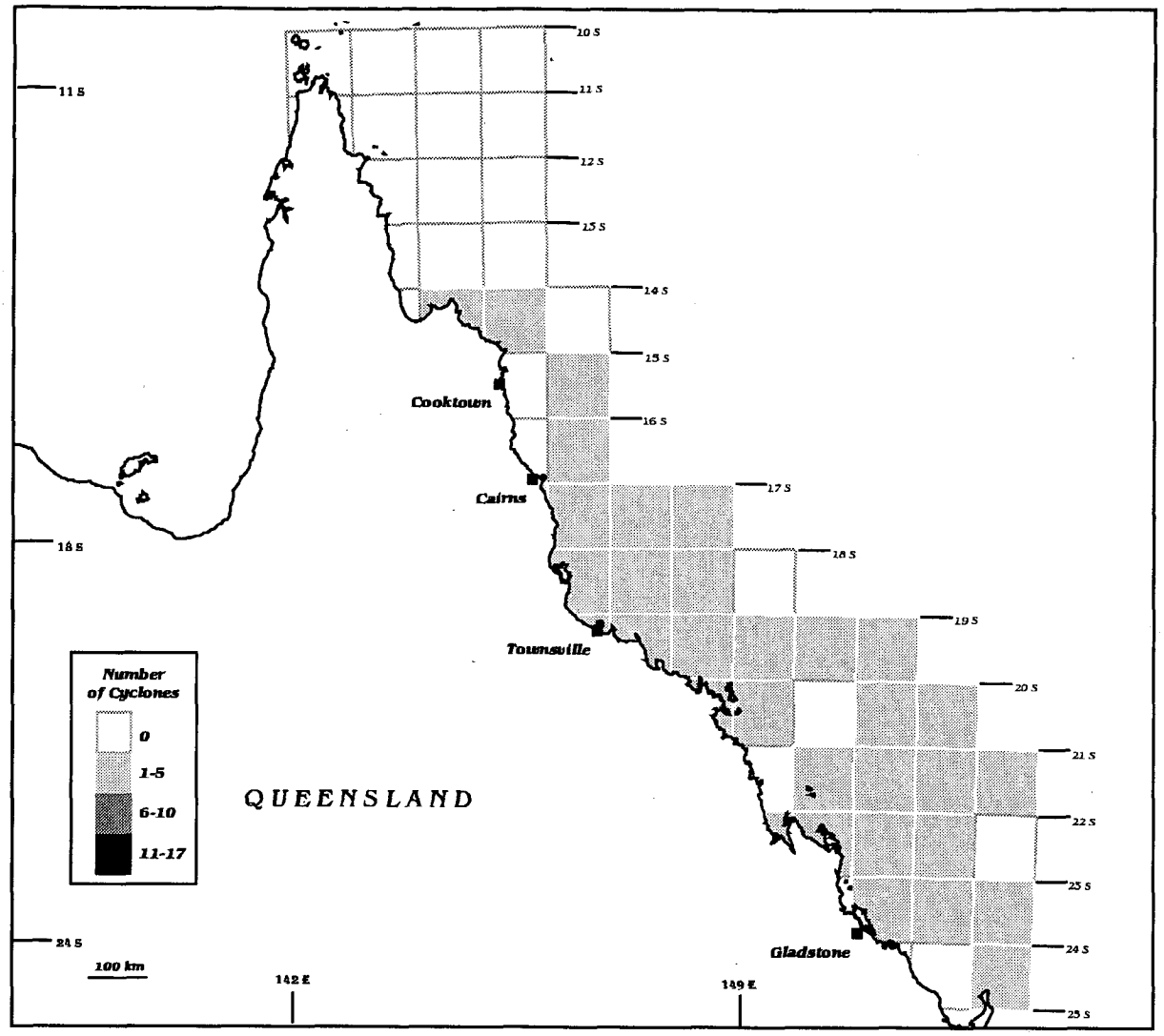


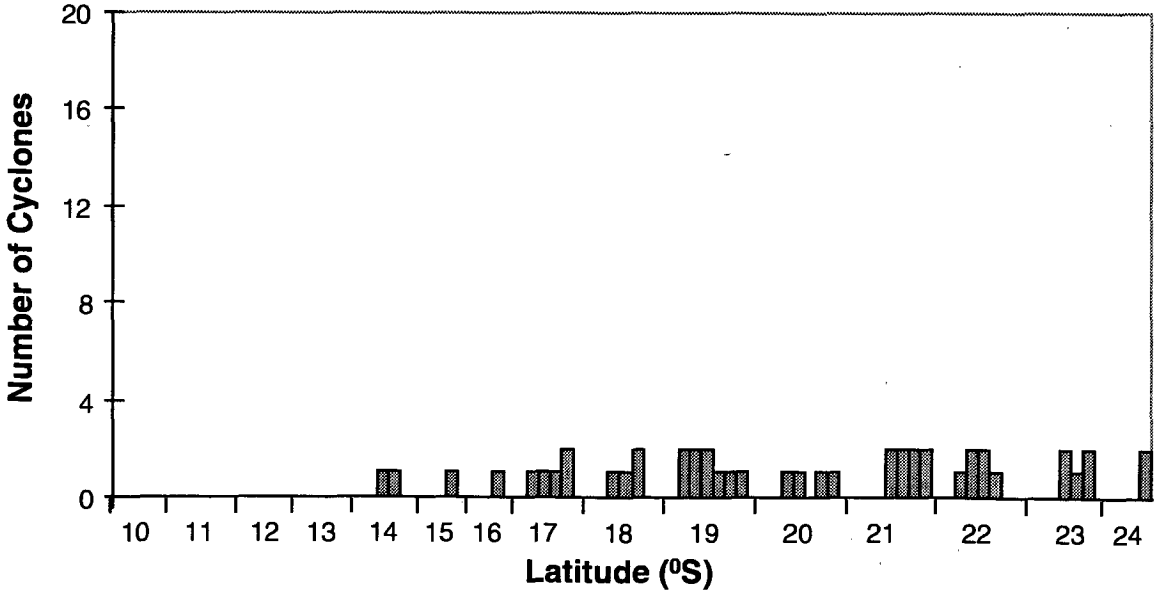
Map 26 : *Number of years before 1997 since the last category 2 cyclone. Boxes classified 30+ years have had no category 2 cyclones pass through them from 1969 to 1997.*



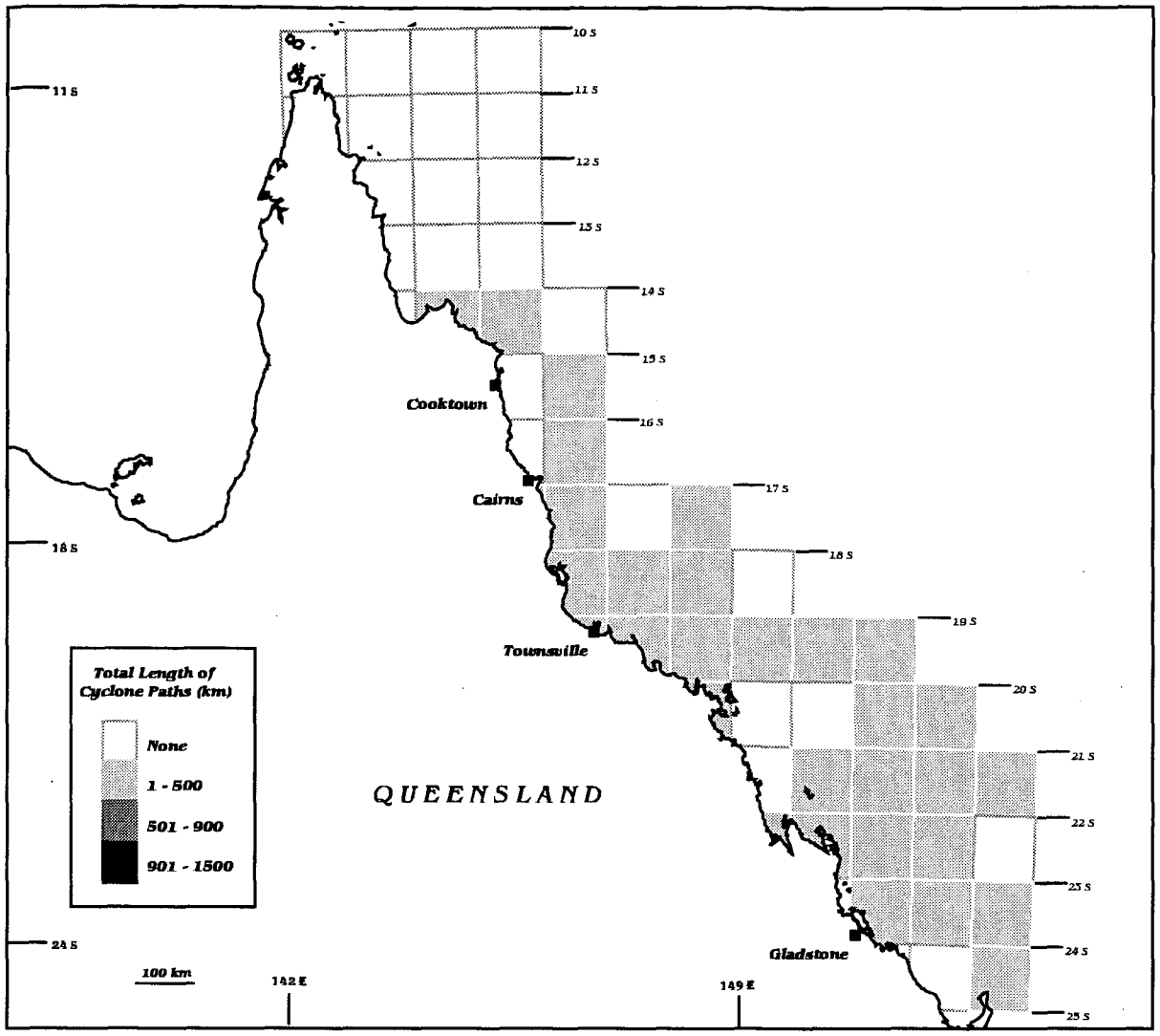


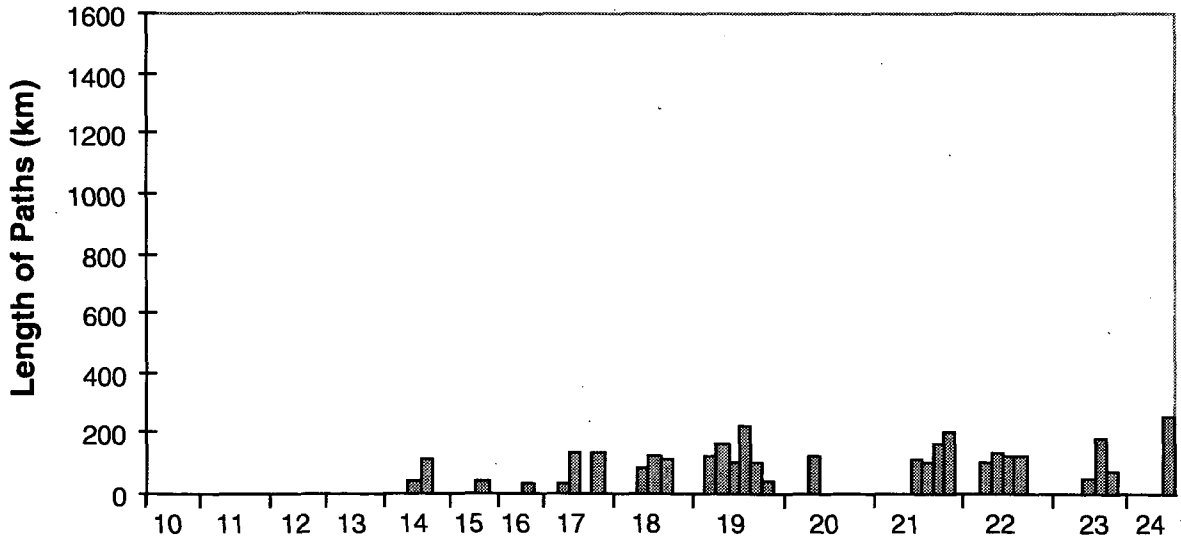
Map 27: *Category 3 cyclones 1969-1997. Dashed lines represent the cyclone paths and shading indicates areas within 100 km of at least one path. The graphs indicate peaks in the number and total path length of category 3 cyclones by latitude.*



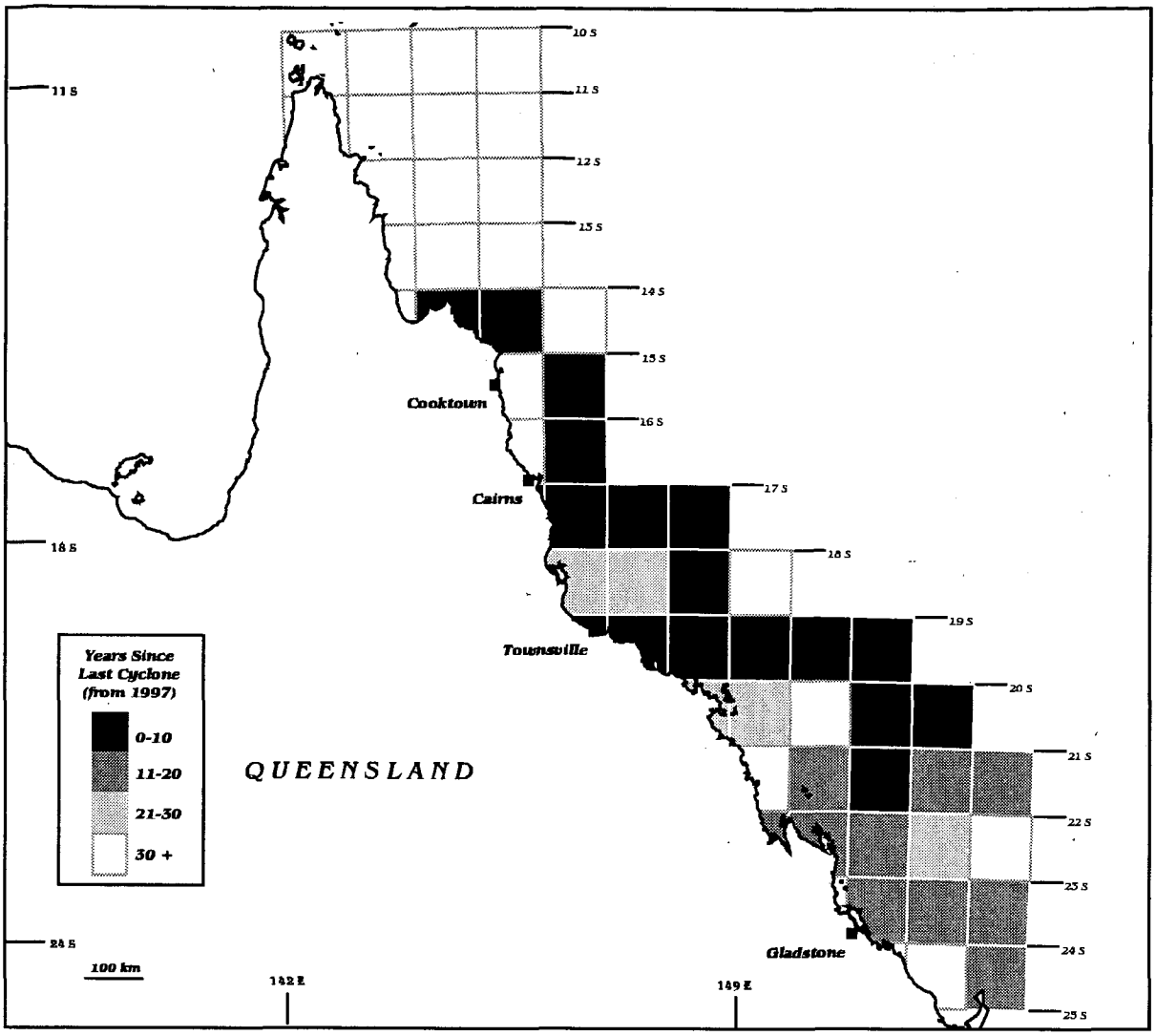


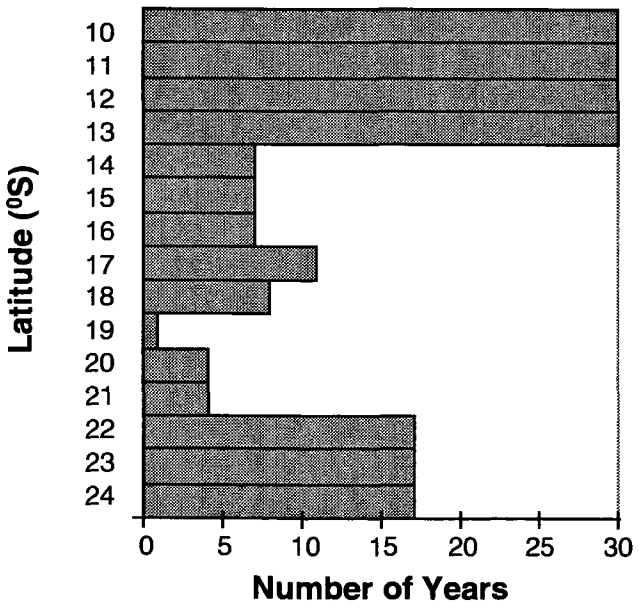
Map 28: *Category 3 cyclones1969-1997: number of cyclones. Seperate bars for each latitude depict the values for each 1^0 latitude by 1^0 longitude box.*



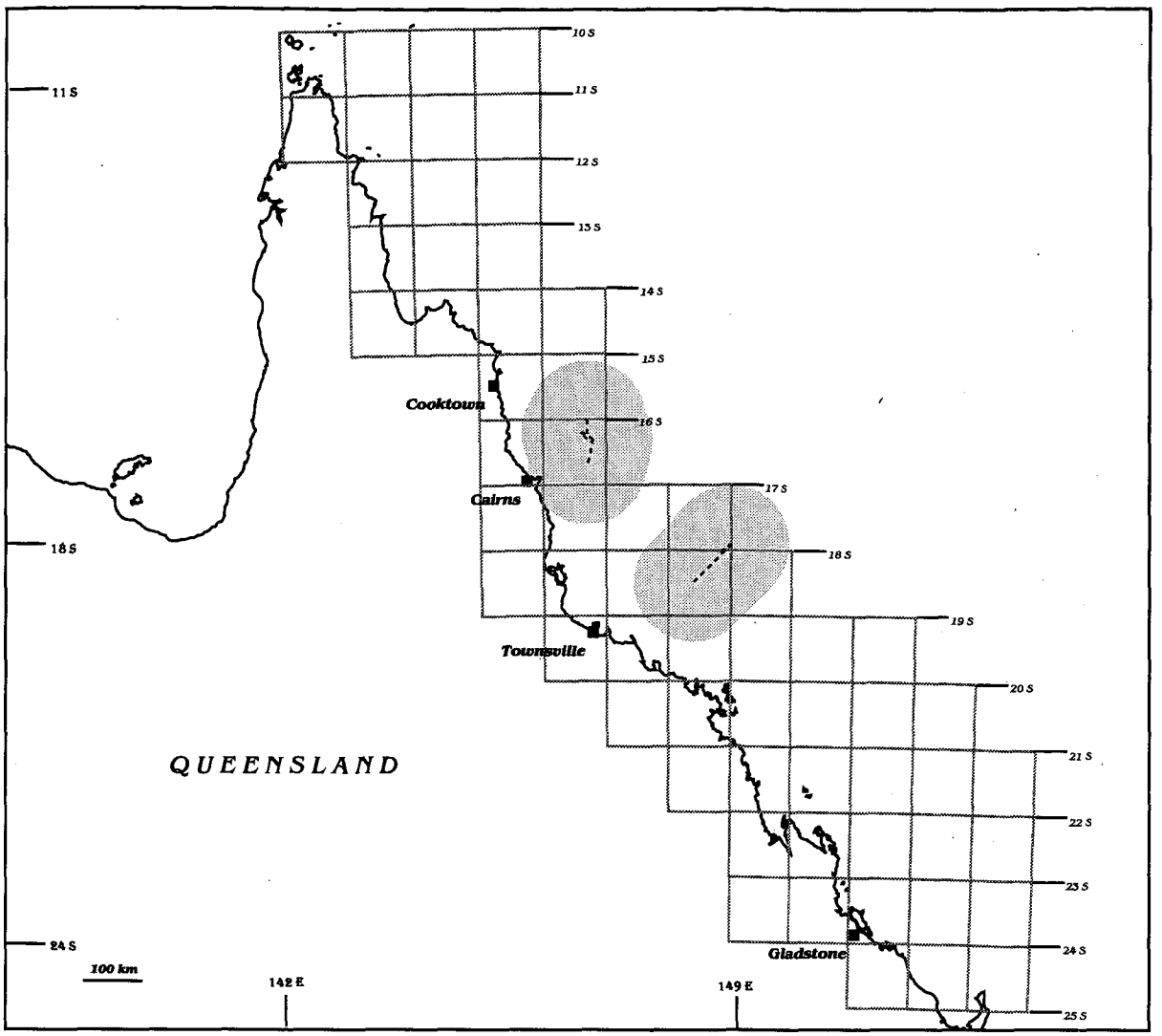


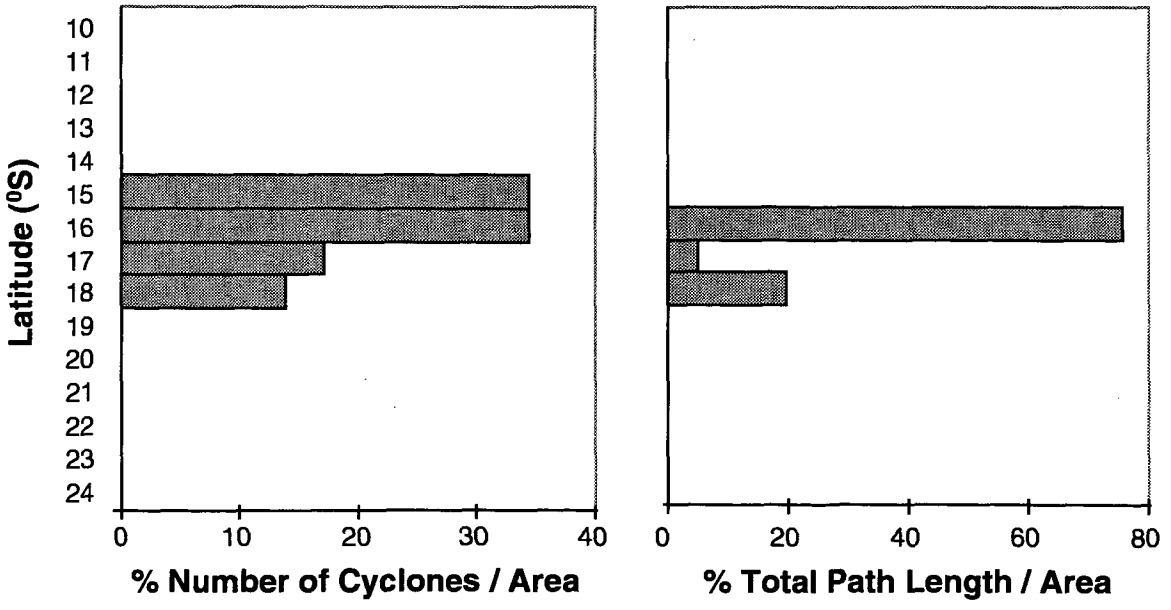
Map 29: *Category 3 cyclones1969-1997: total length of cyclone paths. Seperate bars for each latitude depict the values for each 1^0 latitude by 1^0 longitude box.*



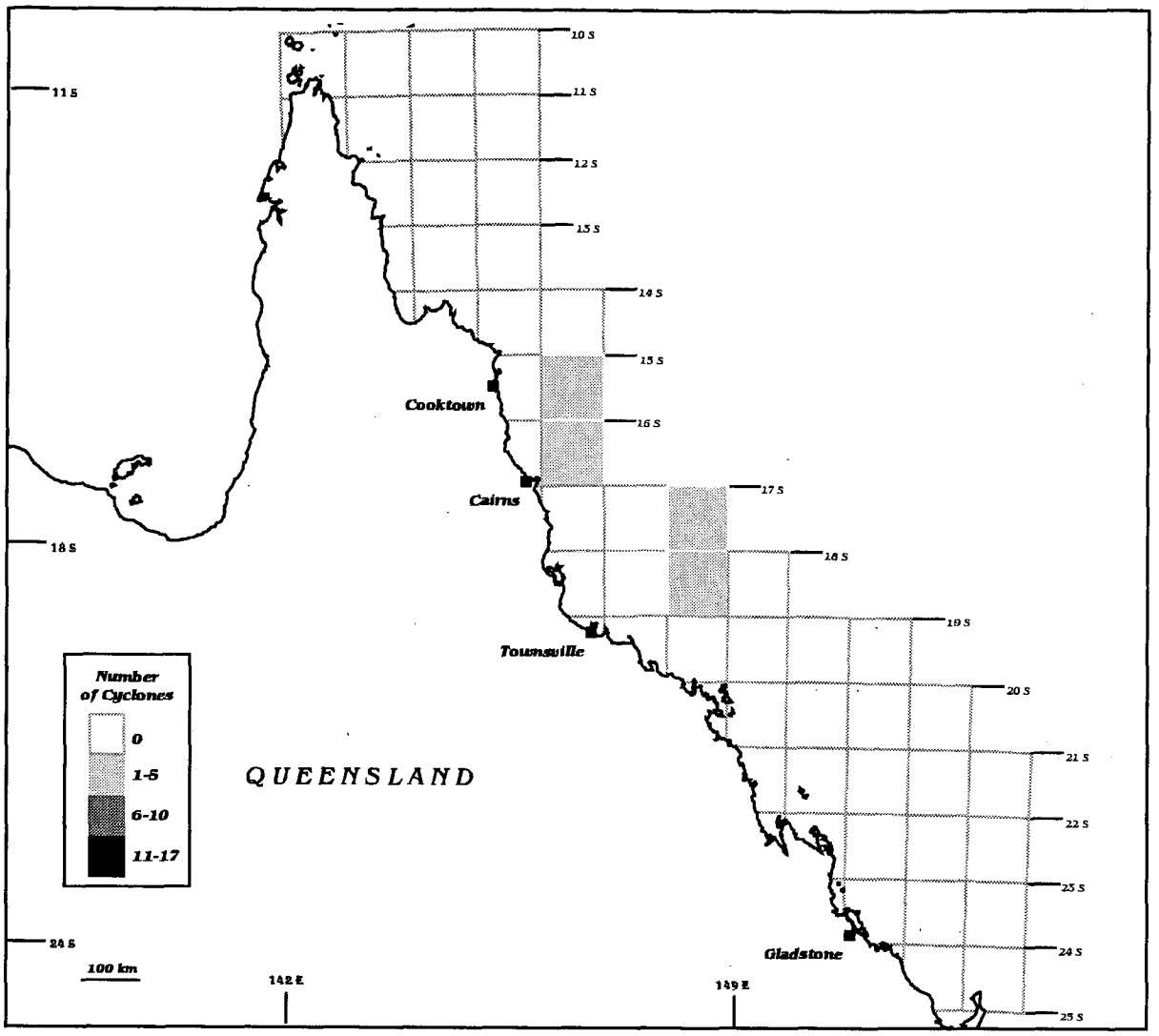


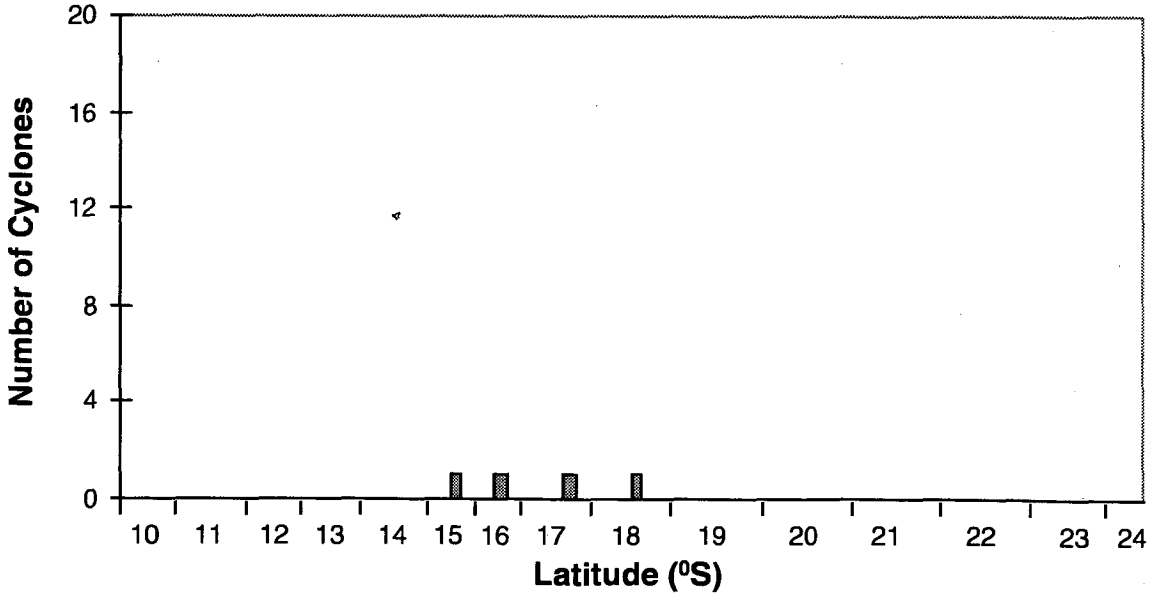
Map 30 : *Number of years before 1997 since the last category 3 cyclone. Boxes classified as 30+ years have had no category 3 cyclones pass through them from 1969 to 1997.*



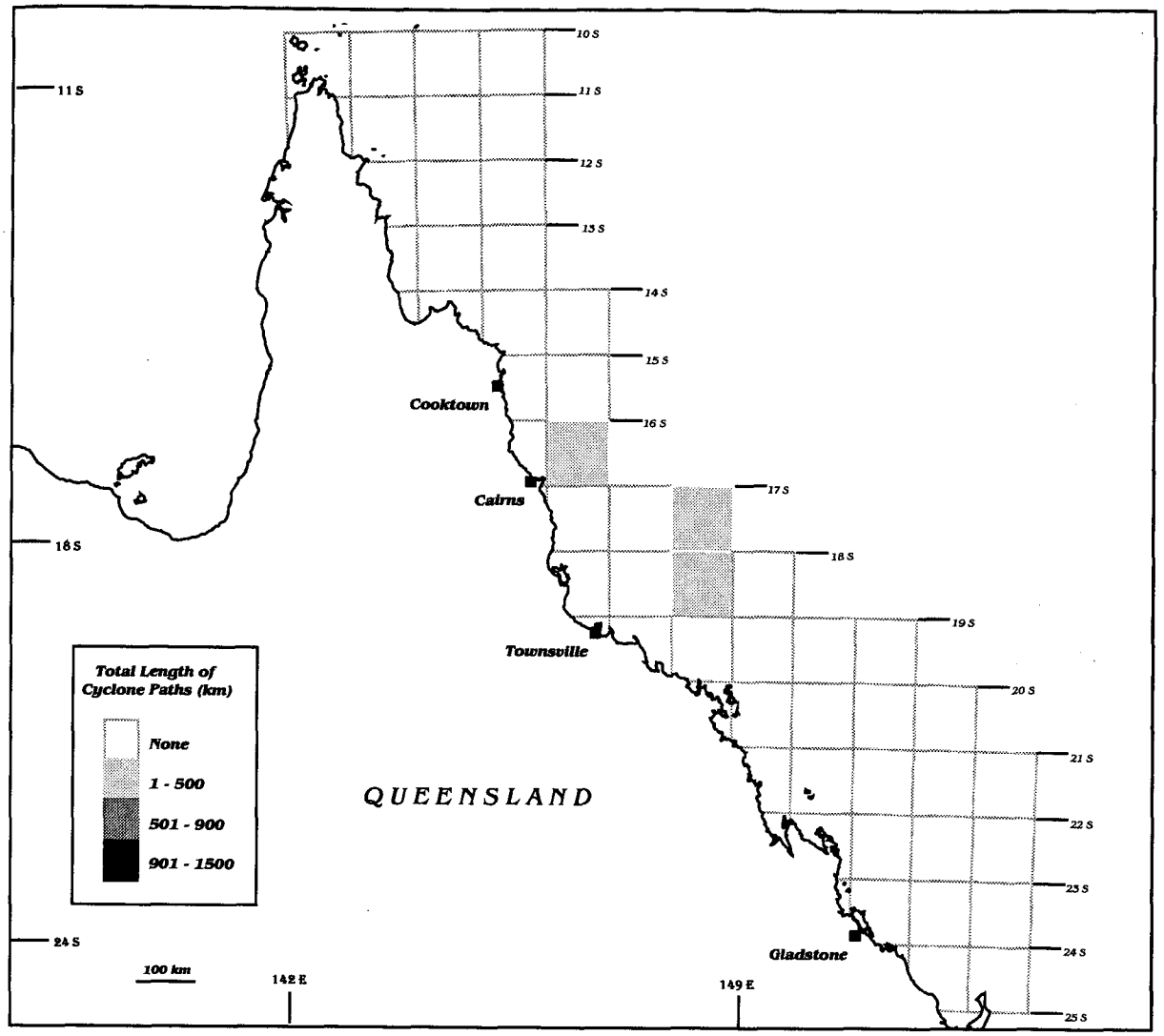


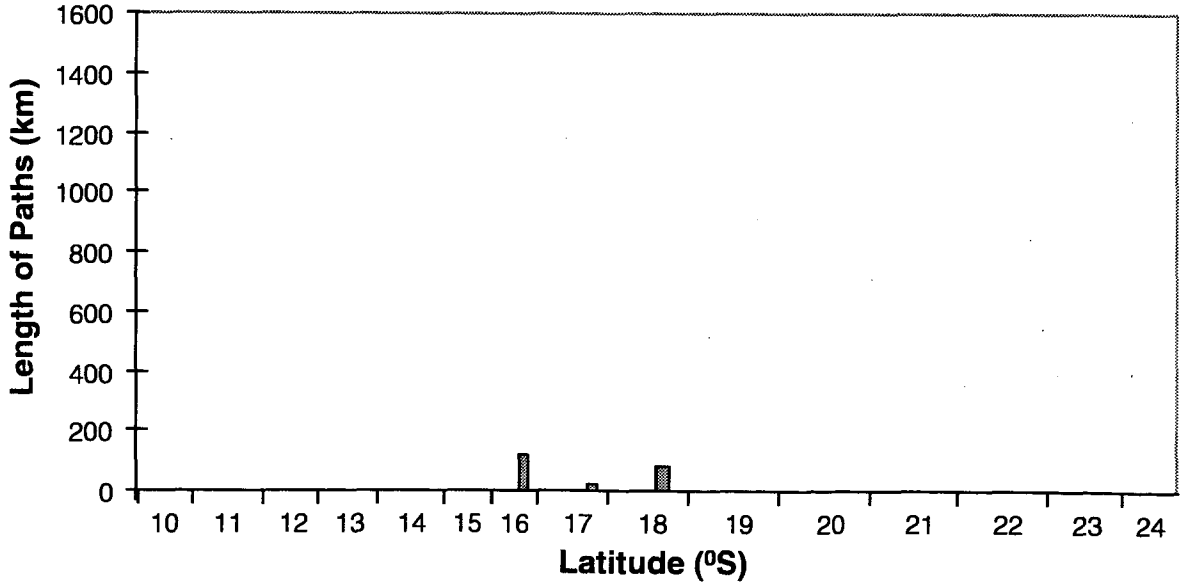
Map 31: *Category 4 cyclones 1969-1997. Dashed lines represent cyclone paths and shading indicates areas within 100 km of at least one path. The graphs indicate peaks in the number and total path length of category 4 cyclones by latitude.*



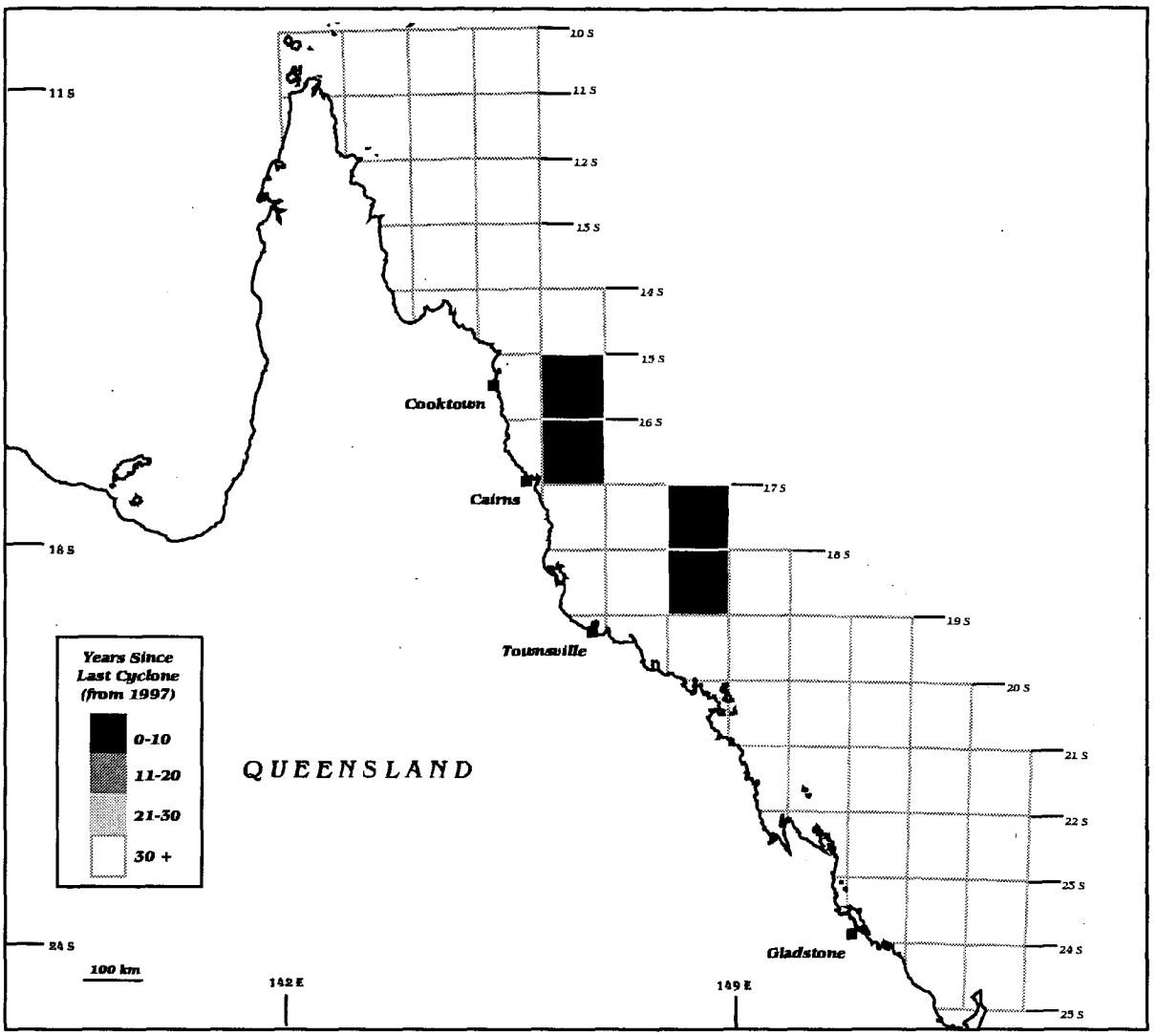


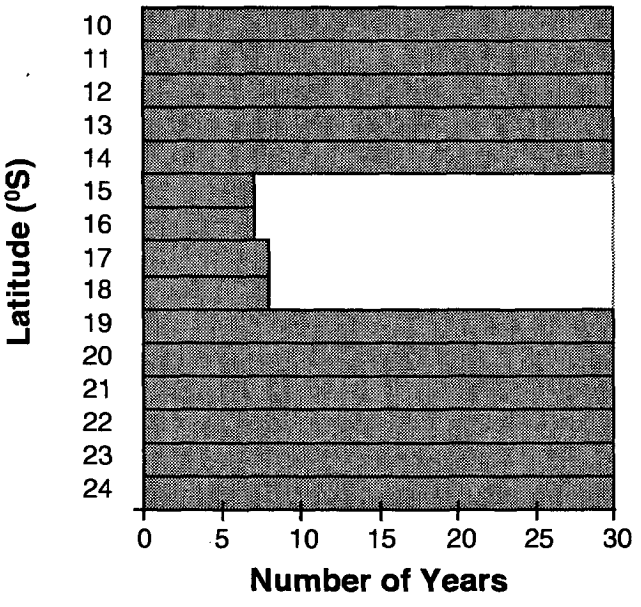
Map 32: *Category 4 cyclones 1969-1997: number of cyclones. Seperate bars for each latitude depict the values for each 1^0 latitude by 1^0 longitude box.*



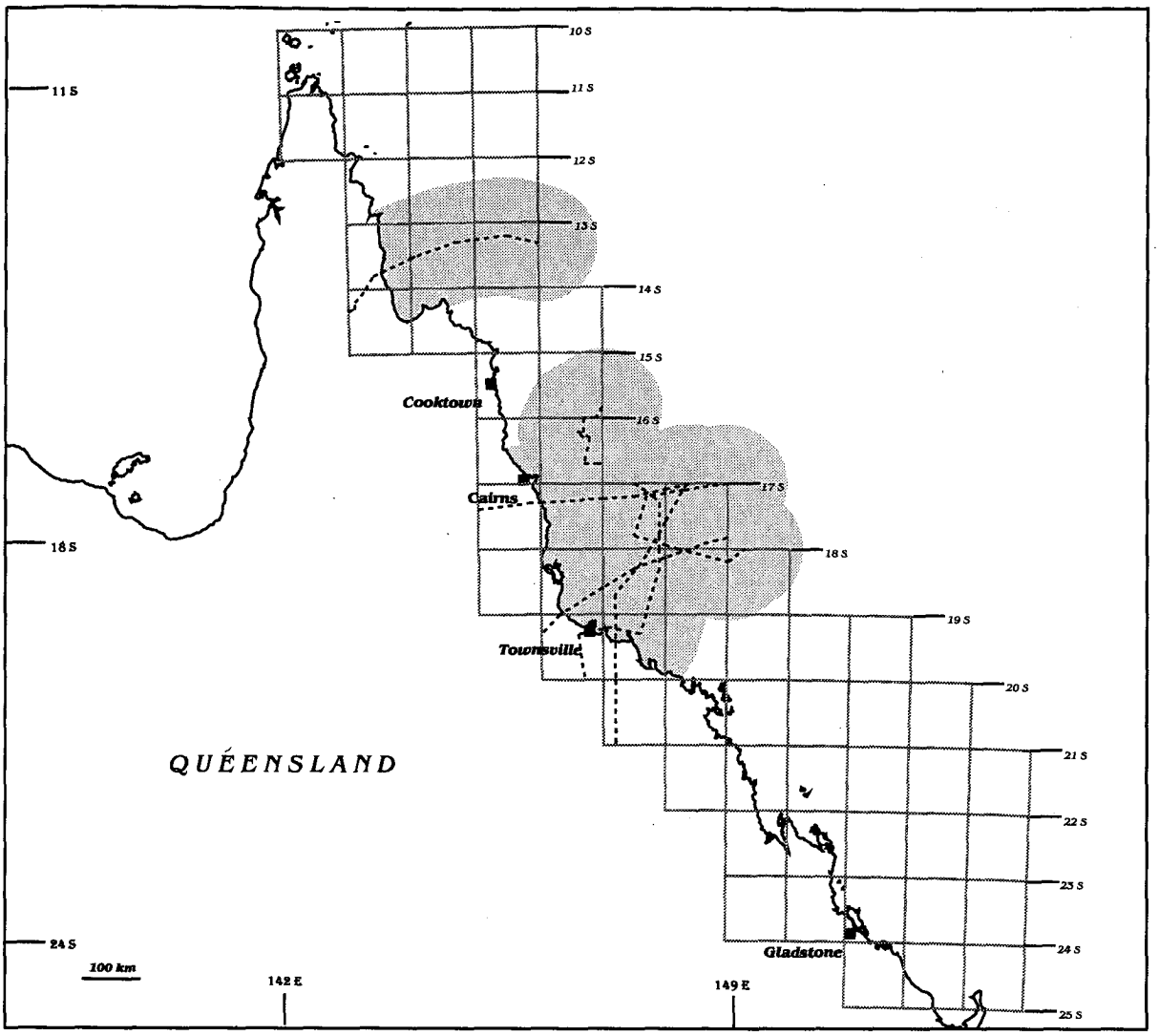


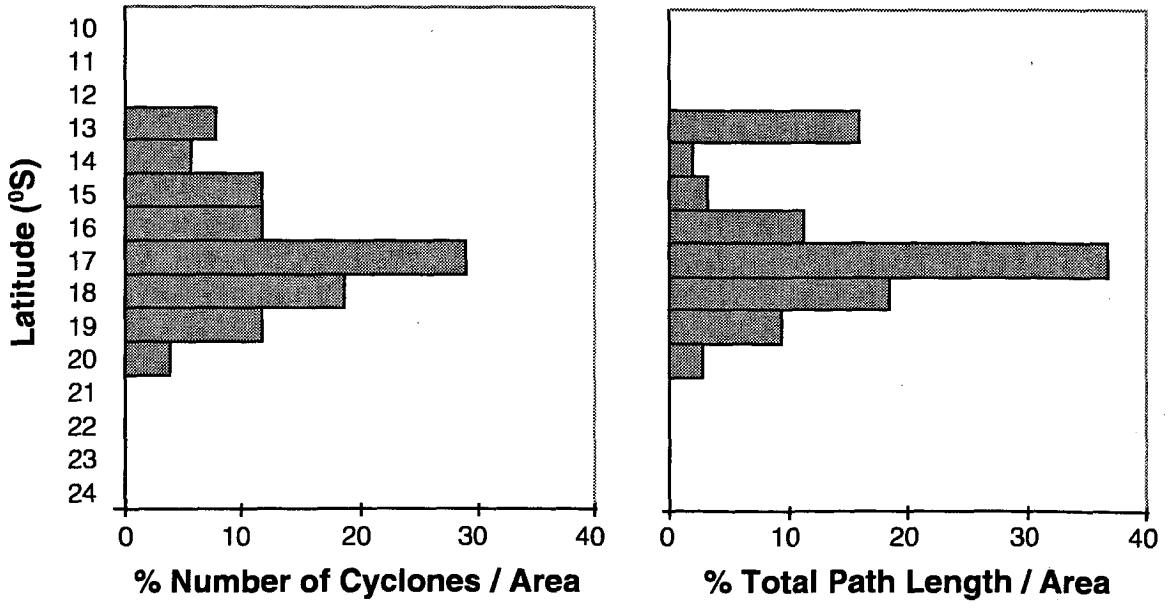
Map 33: *Category 4 cyclones 1969-1997: total length of cyclone paths. Seperate bars for each latitude depict the values for each 1^0 latitude by 1^0 longitude box.*



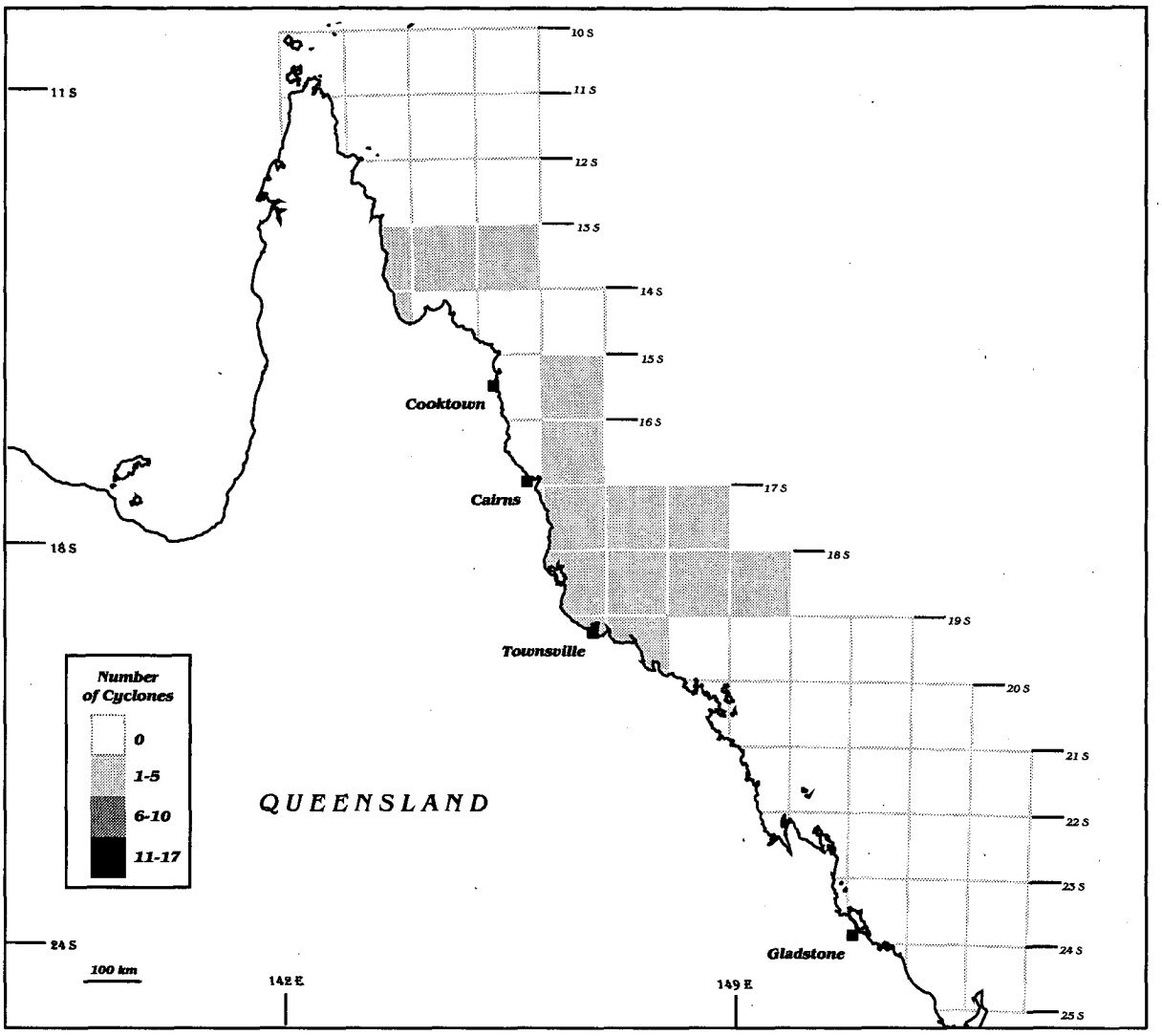


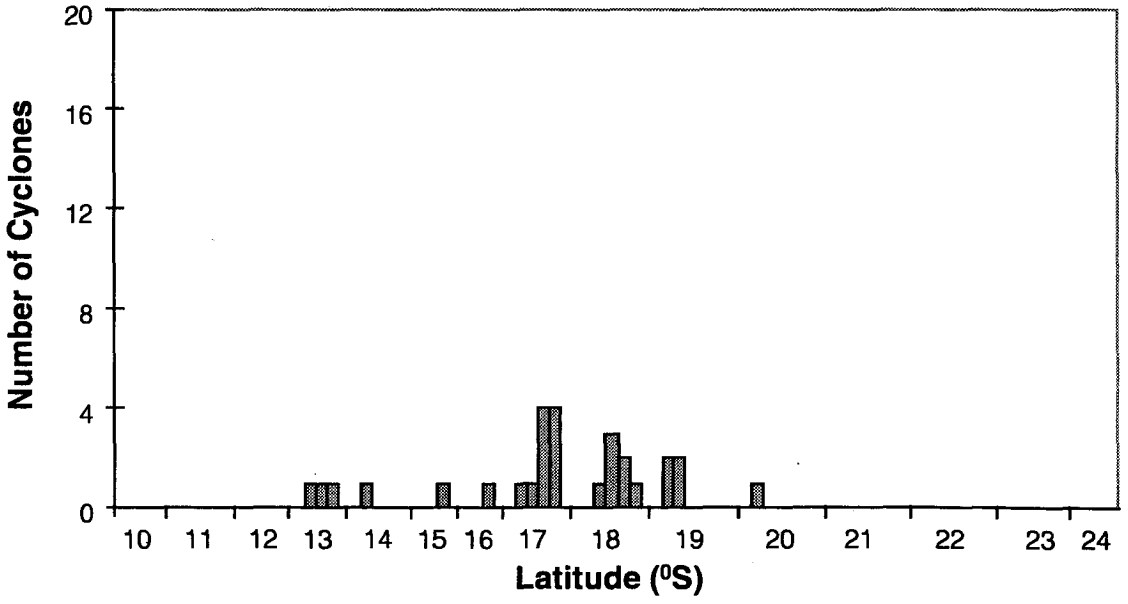
Map 34 : *Number of years before 1997 since the last category 4 cyclone. Boxes classified as 30+ years have had no category 4 cyclones pass through them from 1969 to 1997.*



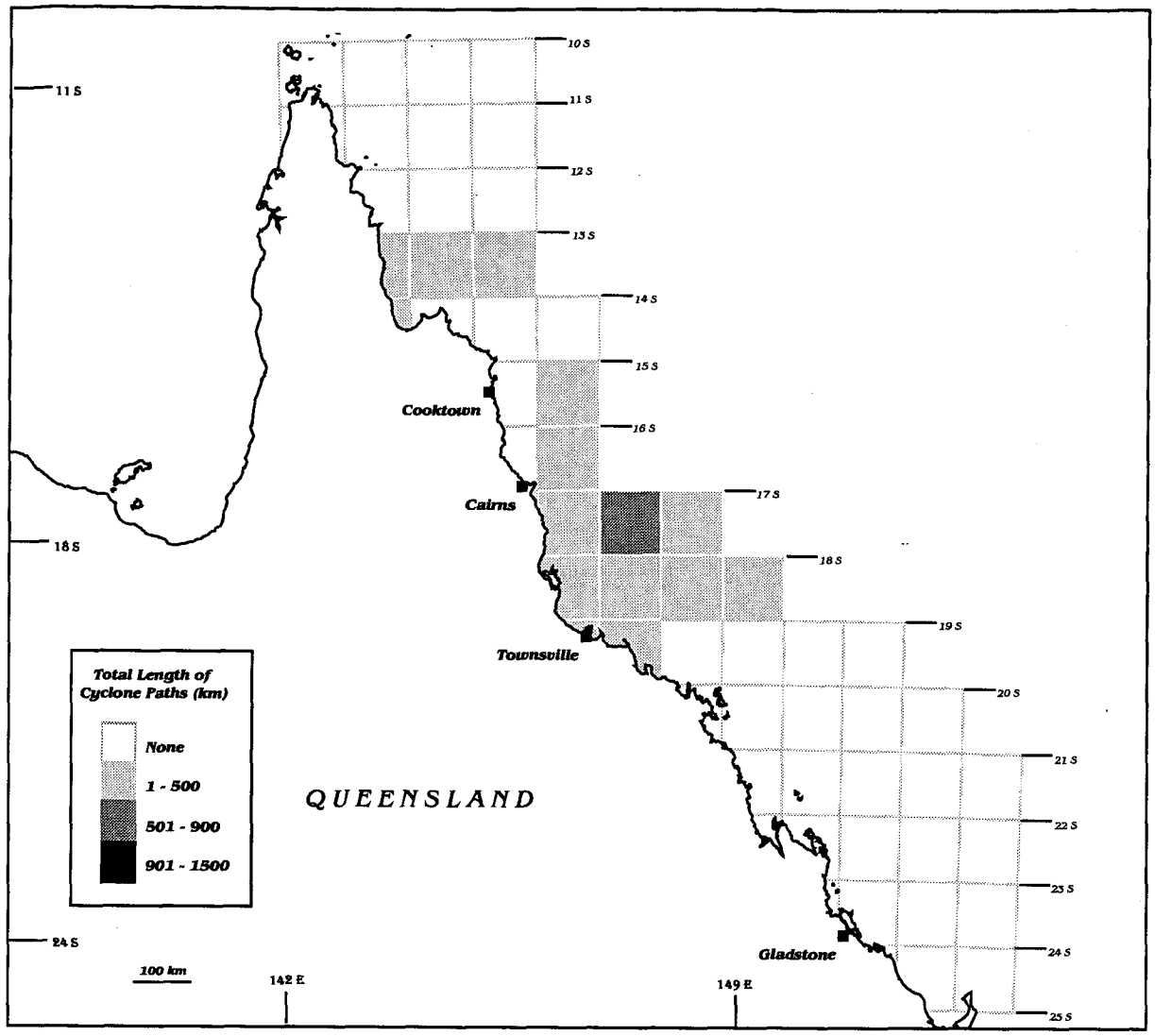


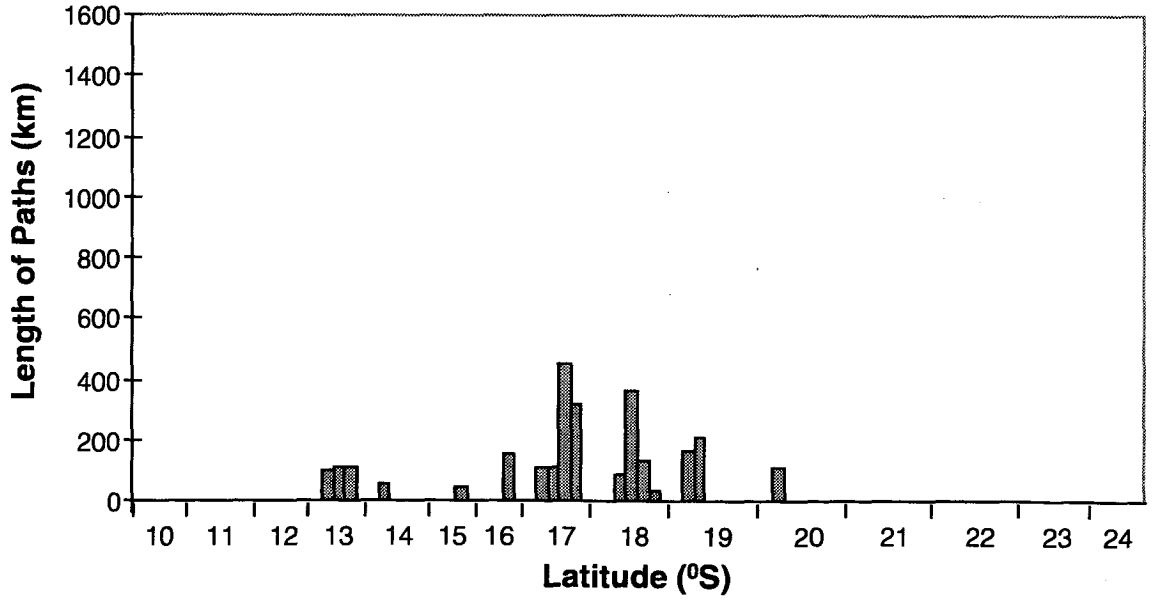
Map 35: *<u>All cyclones in December 1969-1997</u>. Dashed lines represent cyclone paths and shading indicates areas within 100 km of at least one path. The graphs indicate peaks in the number and total path length of all cyclones in December by latitude.*



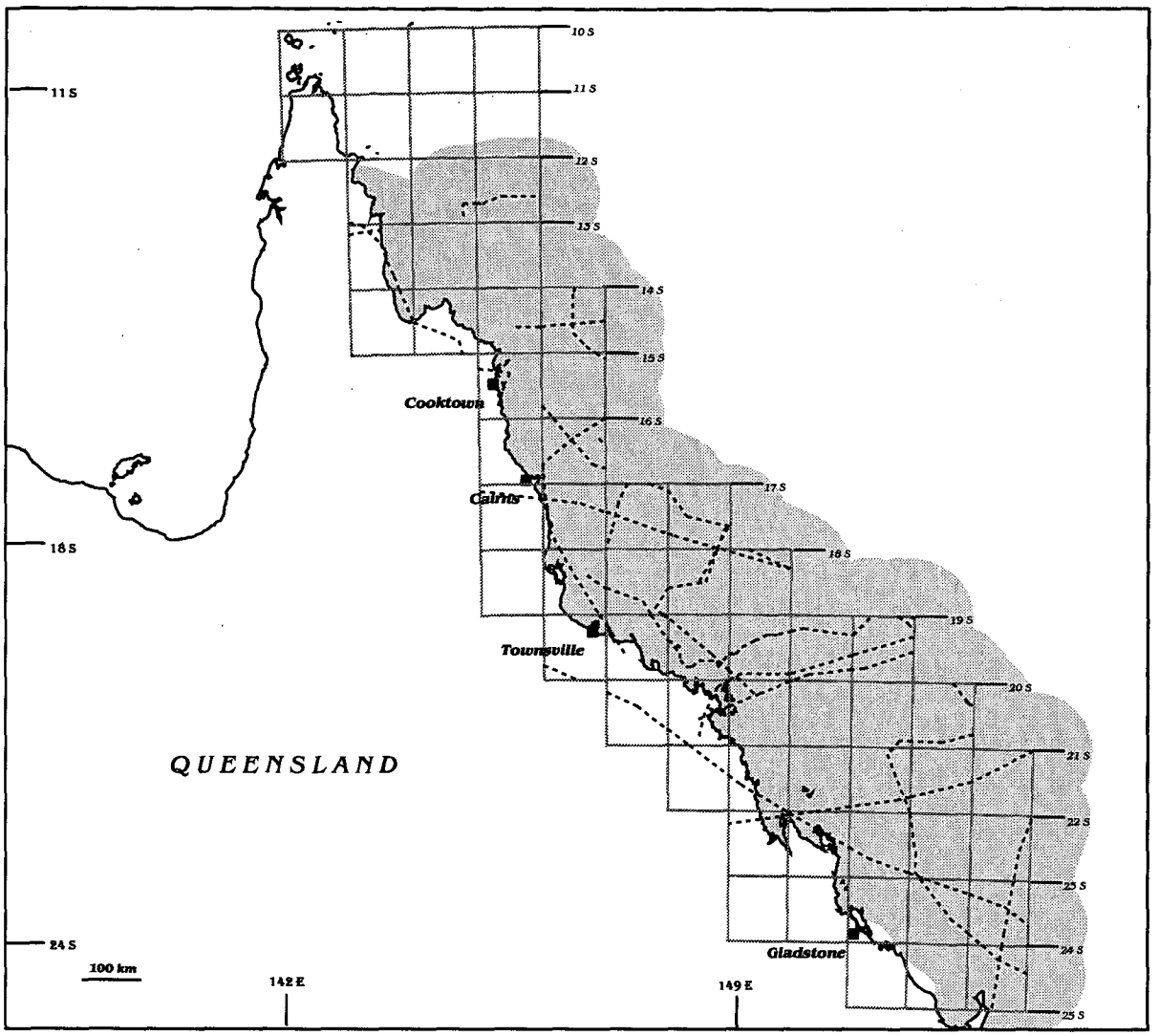


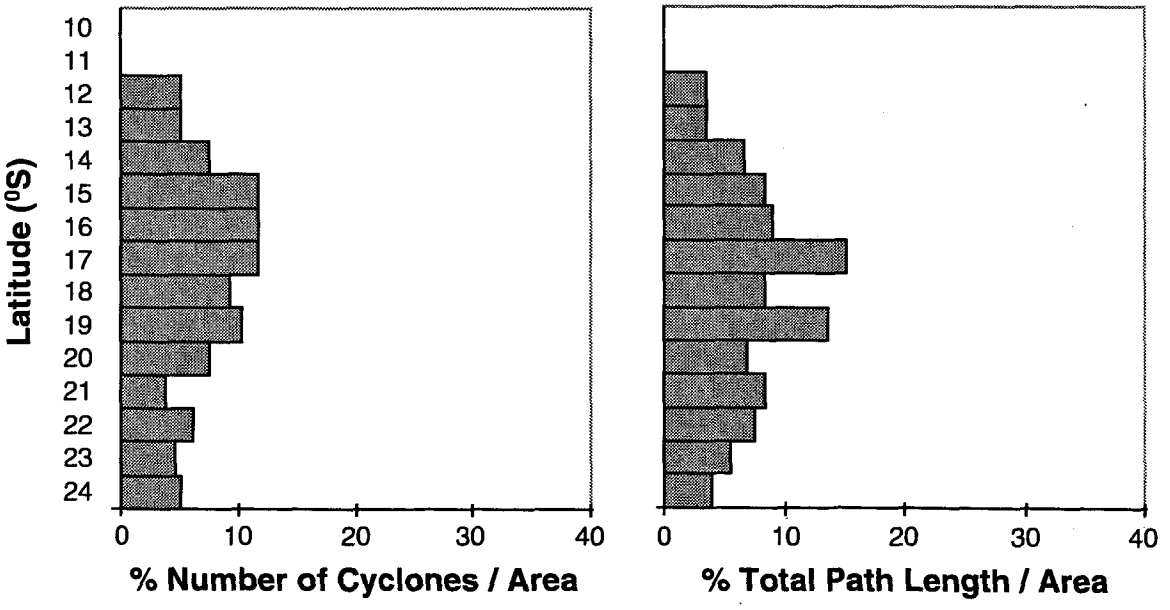
Map 36: *<u>All cyclones in December 1969-1997: number of cyclones</u>. Seperate bars for each latitude depict the values for each 1^0 latitude by 1^0 longitude box.*



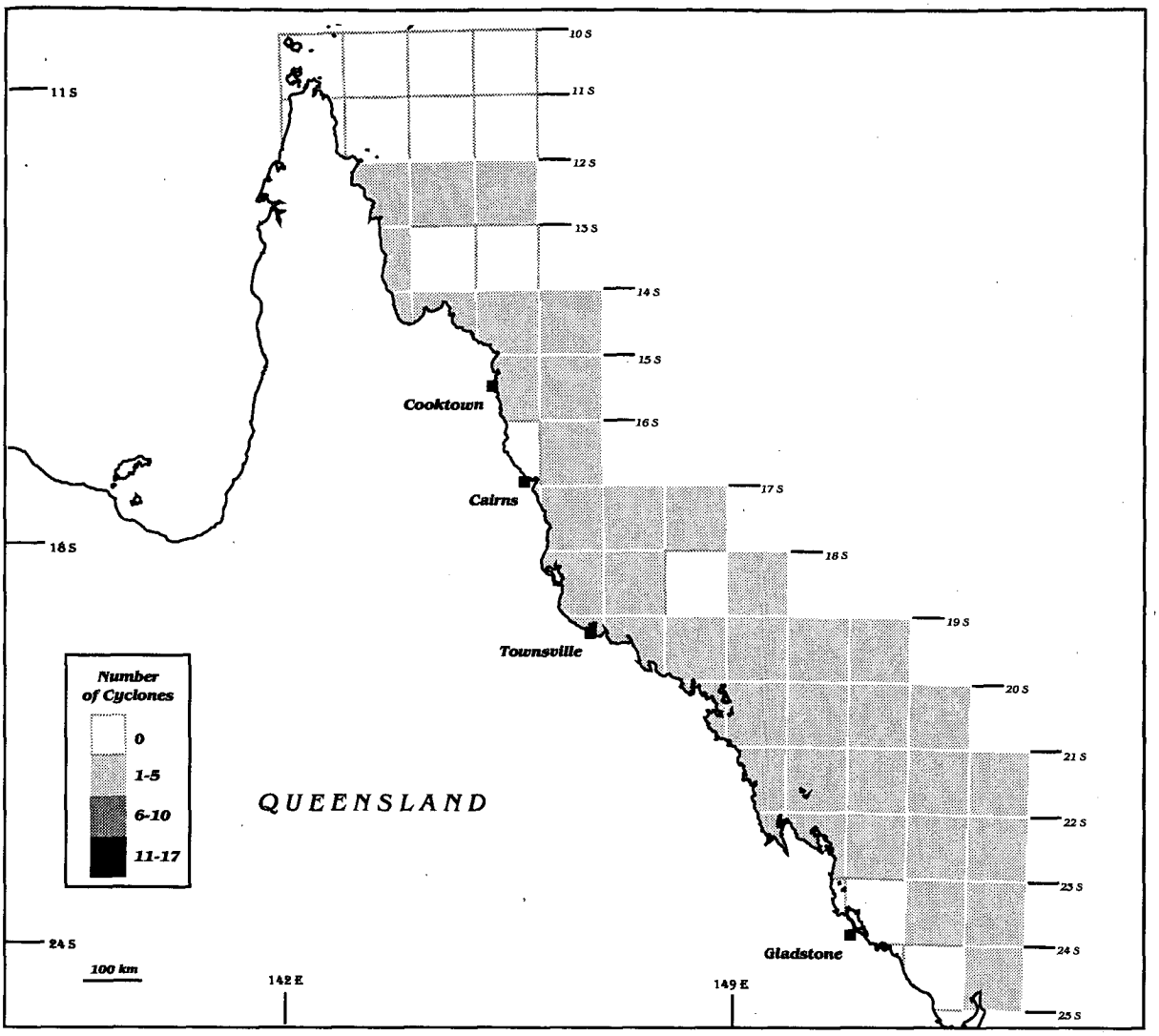


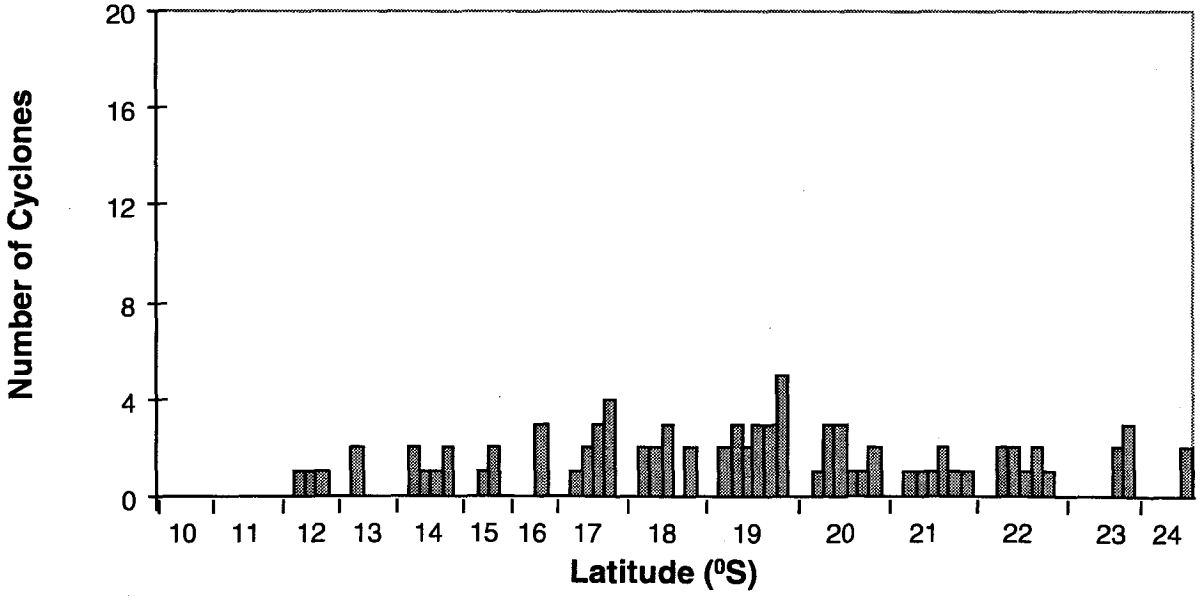
Map 37: *<u>All cyclones in December 1969-1997: total length of cyclone paths</u>. Seperate bars for each latitude depict the values for each 1^0 latitude by 1^0 longitude box.*



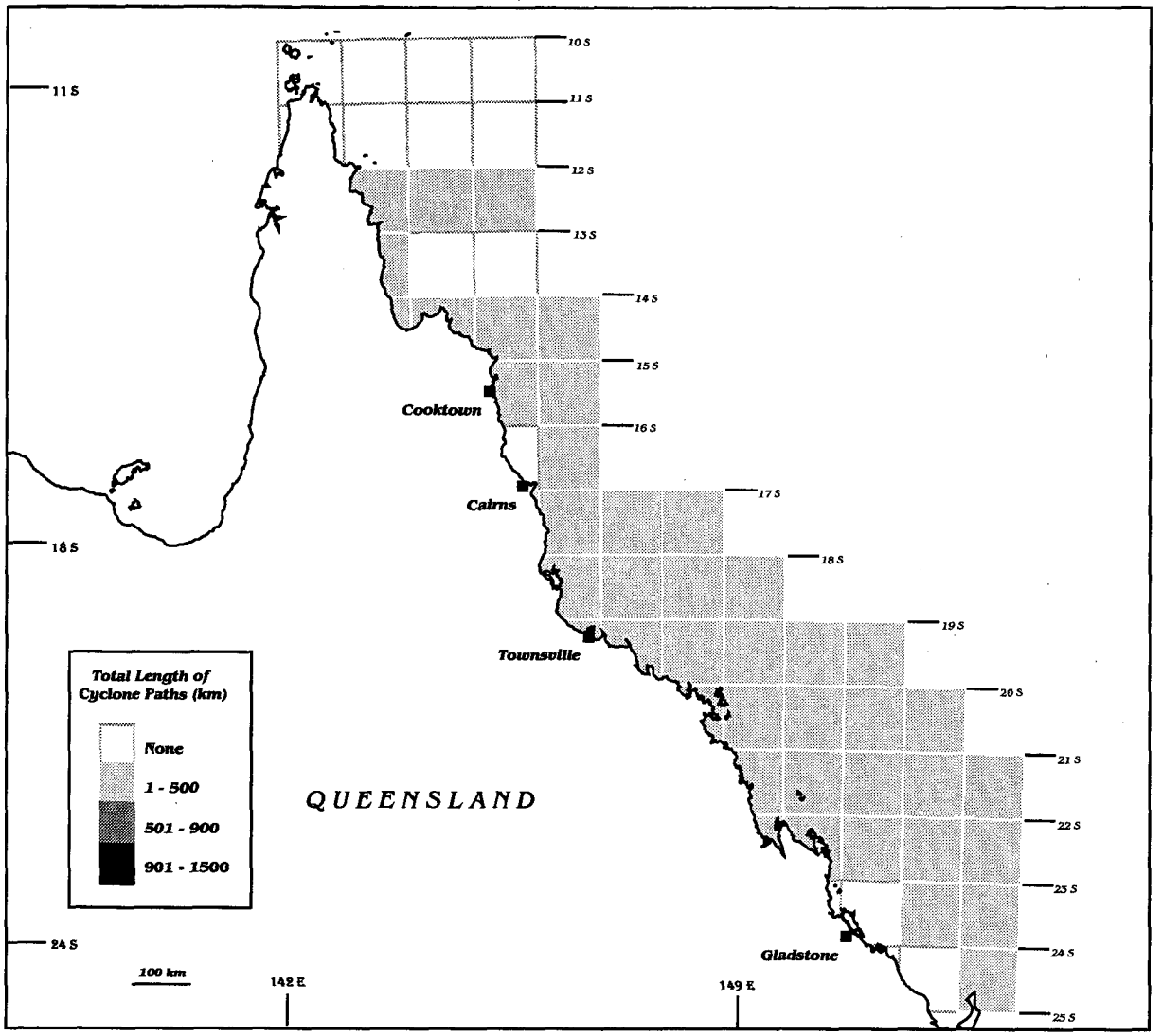


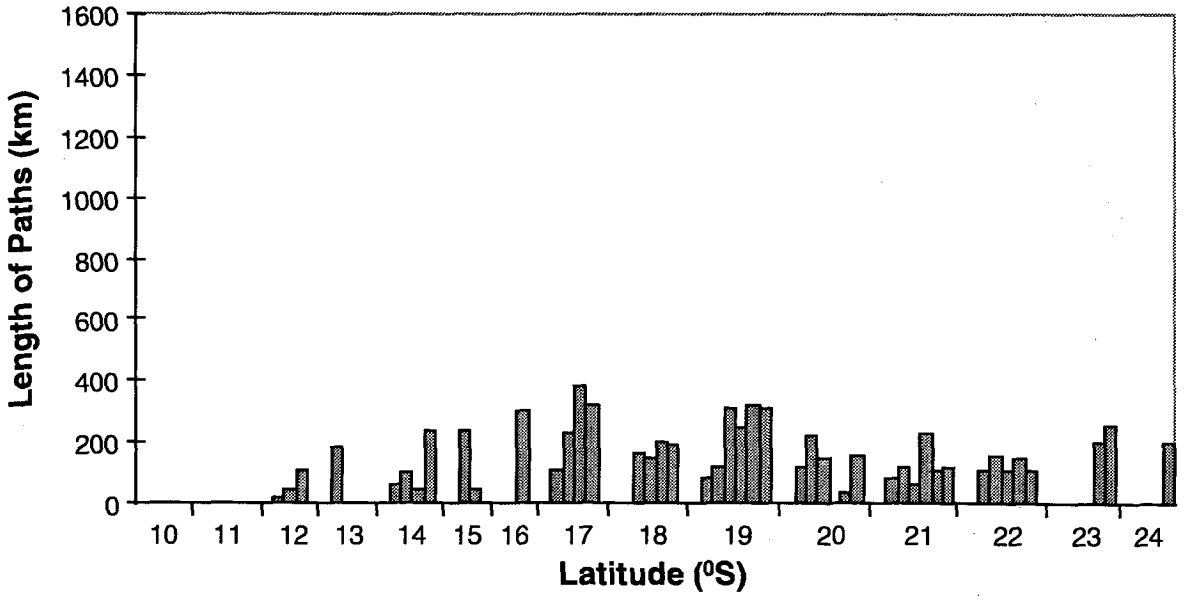
Map 38: *<u>All cyclones in January 1969-1997</u>. Dashed lines represent cyclone paths and shading indicates areas within 100 km of at least one path. The graphs indicate peaks in the number and total path length of all cyclones in January by latitude.*



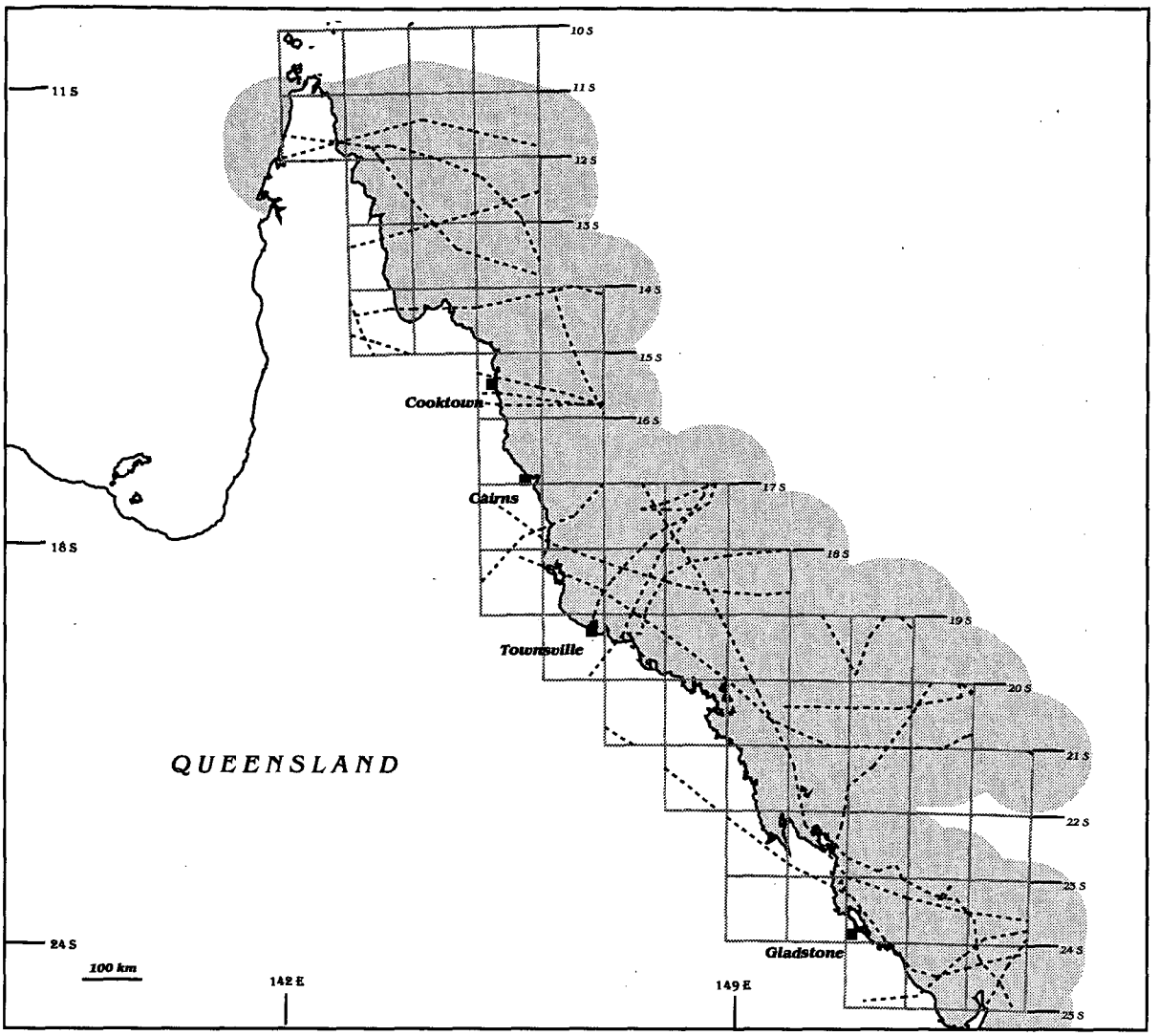


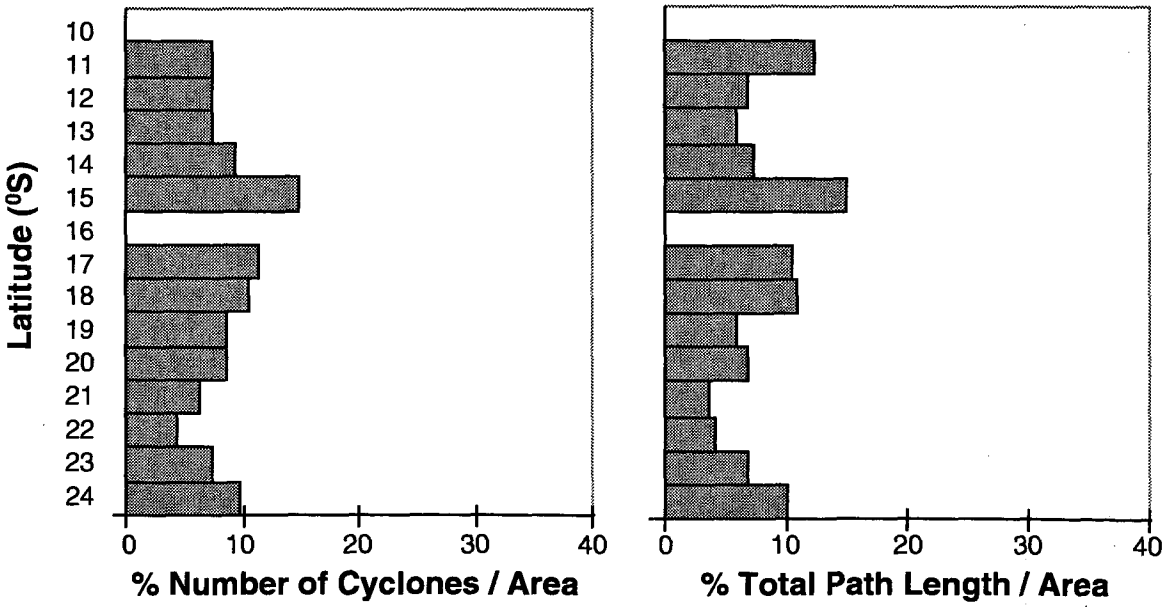
Map 39: *<u>All cyclones in January 1969-1997: number of cyclones</u>. Seperate bars for each latitude depict the values for each 1^0 latitude by 1^0 longitude box.*



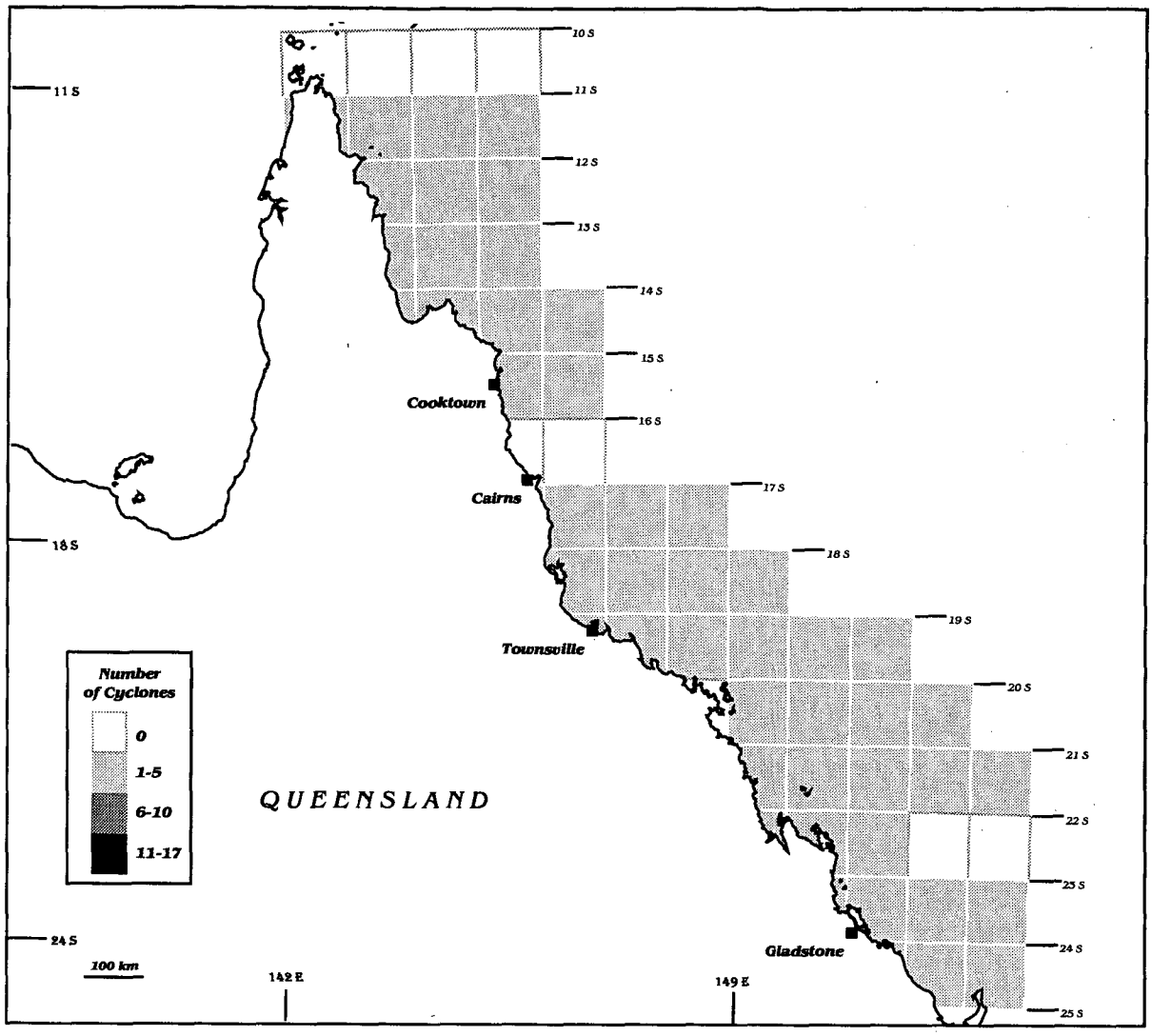


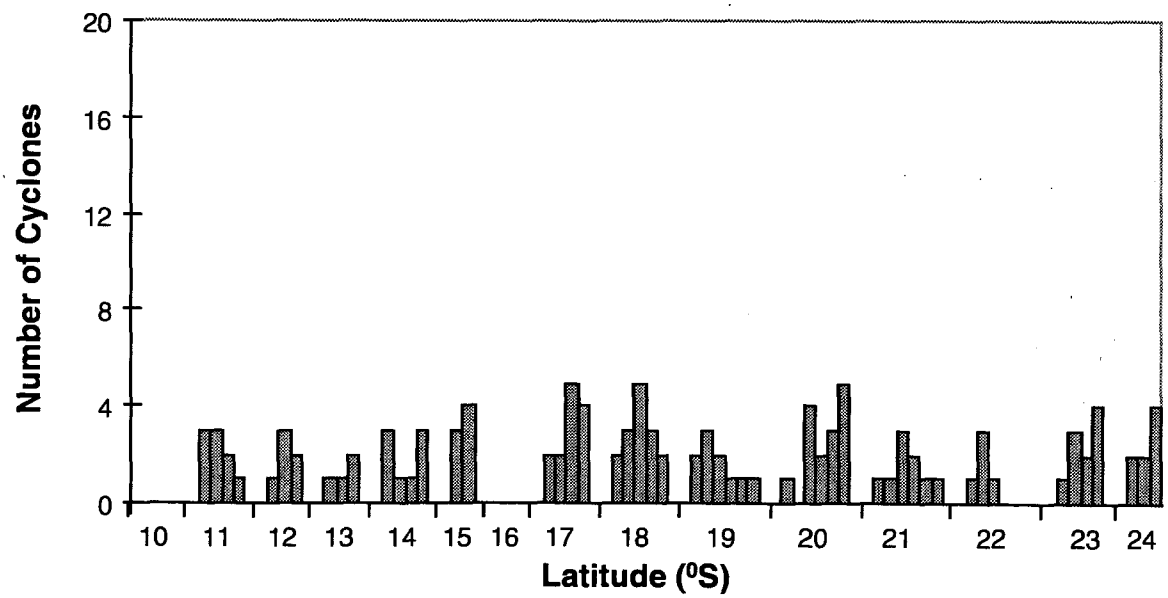
Map 40: *<u>All cyclones in January 1969-1997: total length of cyclone paths</u>. Seperate bars for each latitude depict the values for each 1^0 latitude by 1^0 longitude box.*



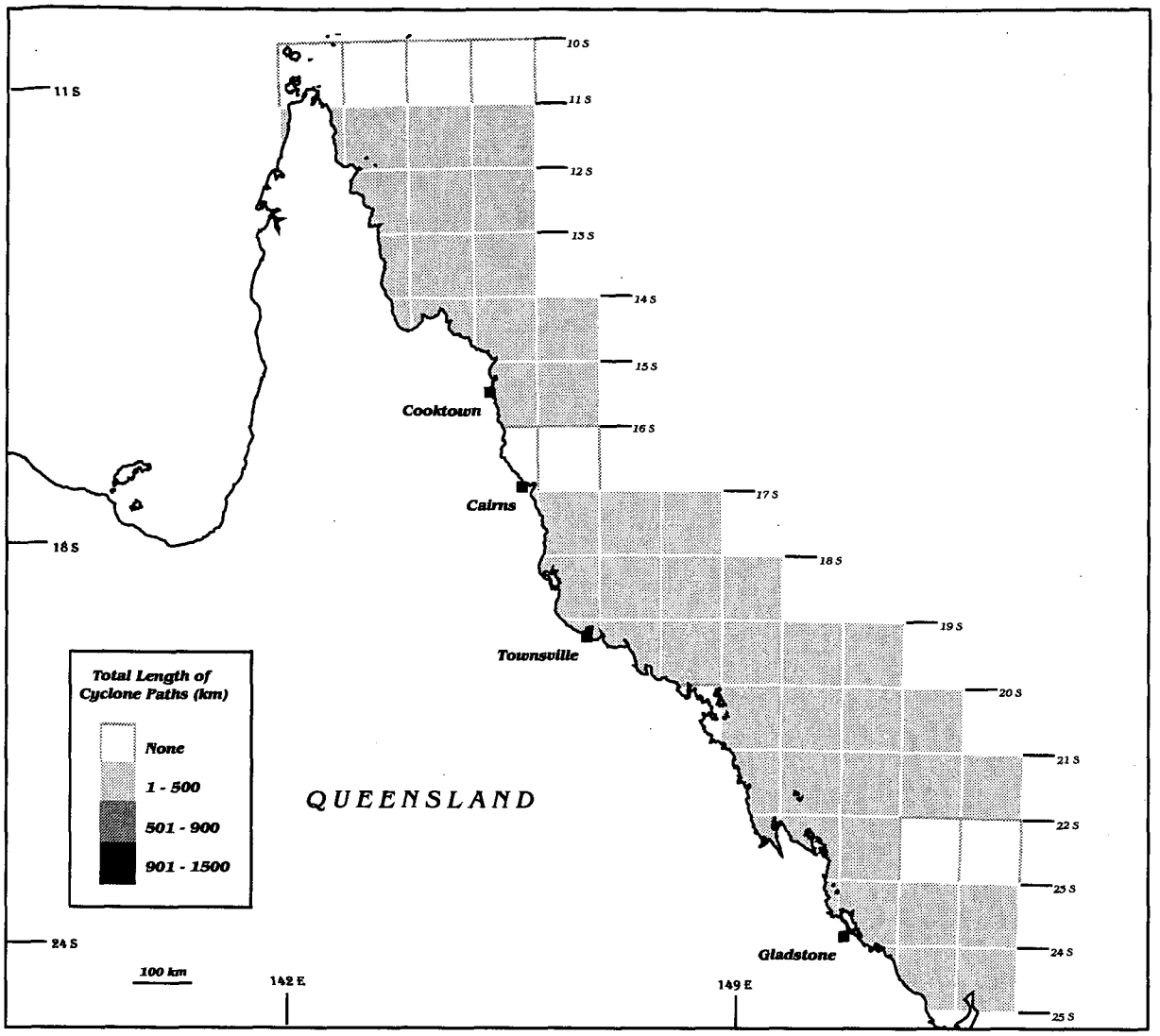


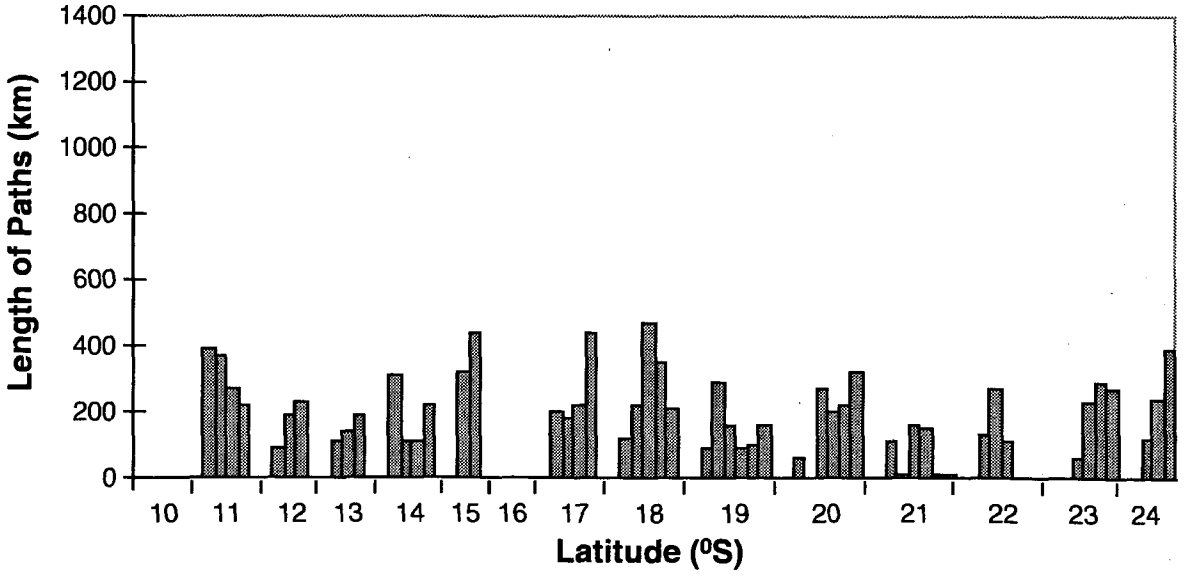
Map 41: *<u>All cyclones in February 1969-1997</u>. Dashed lines represent cyclone paths and shading indicates areas within 100 km of at least one path. The graphs indicate peaks in the number and total path length of all cyclones in February by latitude.*



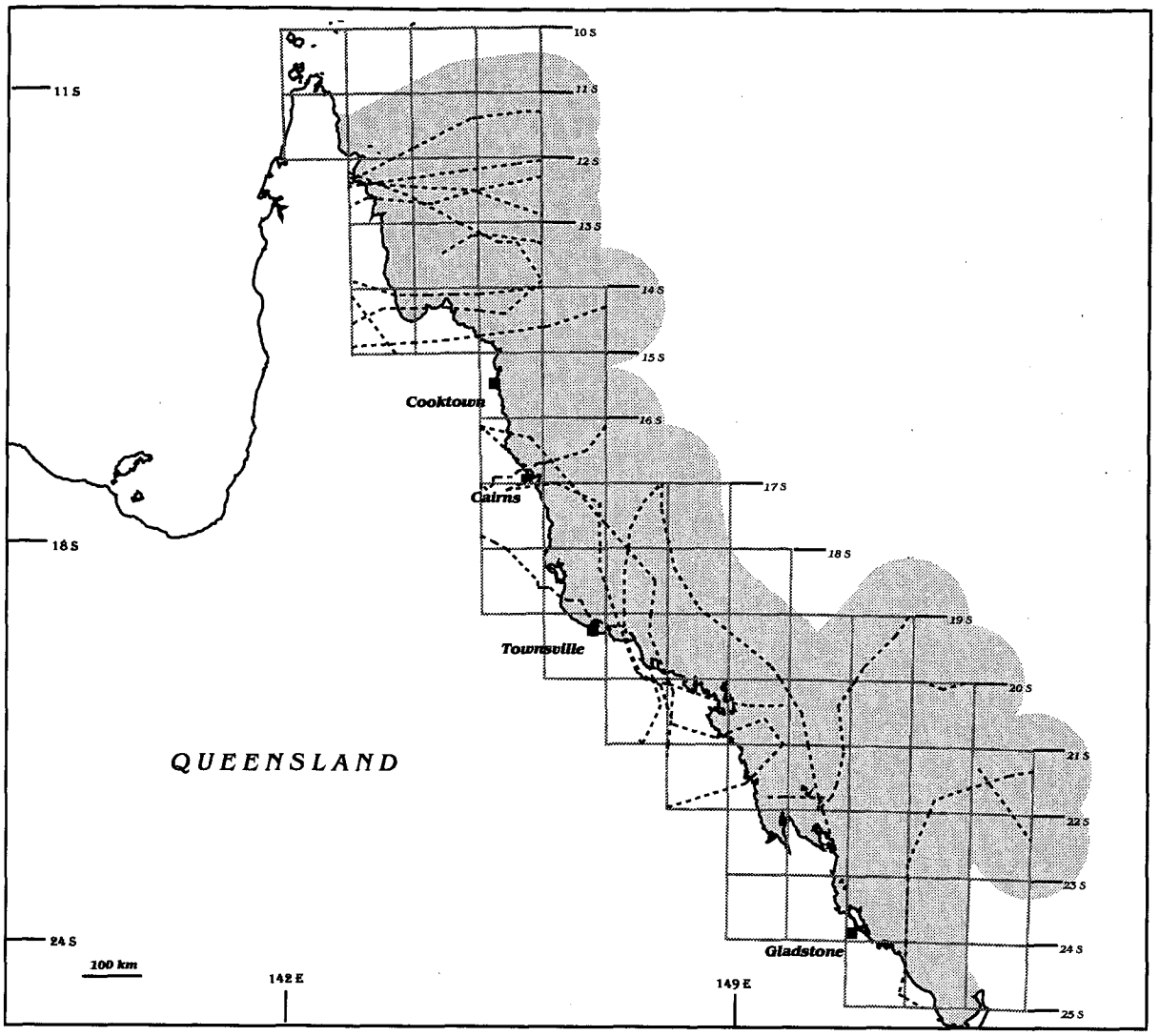


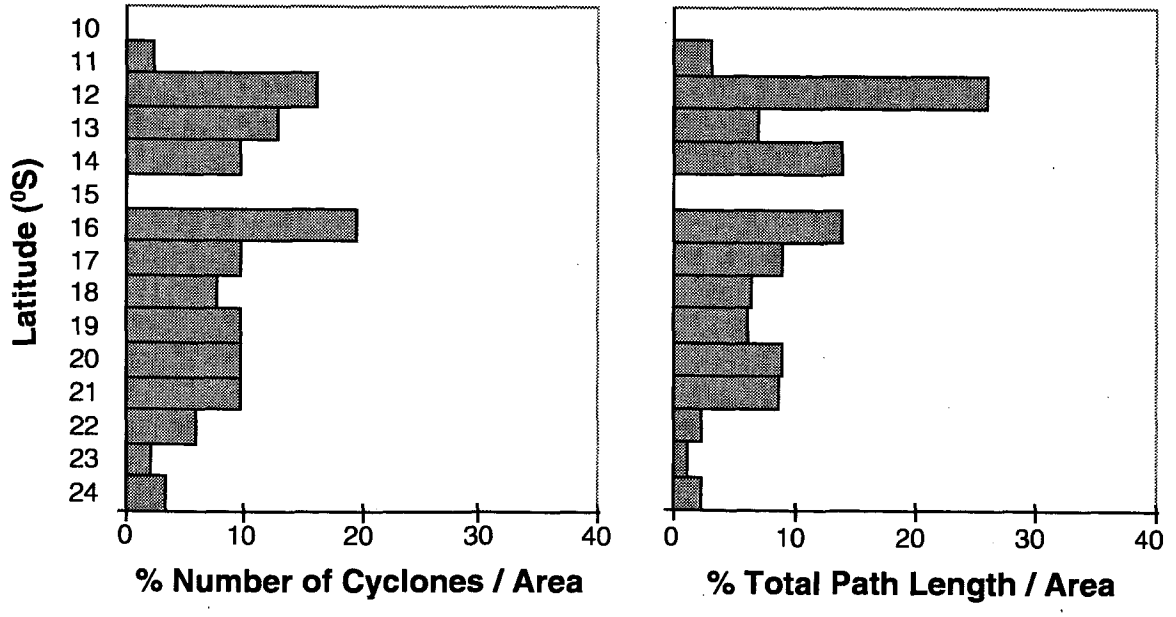
Map 42: *<u>All cyclones in February 1969-1997: number of cyclones</u>. Seperate bars for each latitude depict the values for each 1^0 latitude by 1^0 longitude box.*



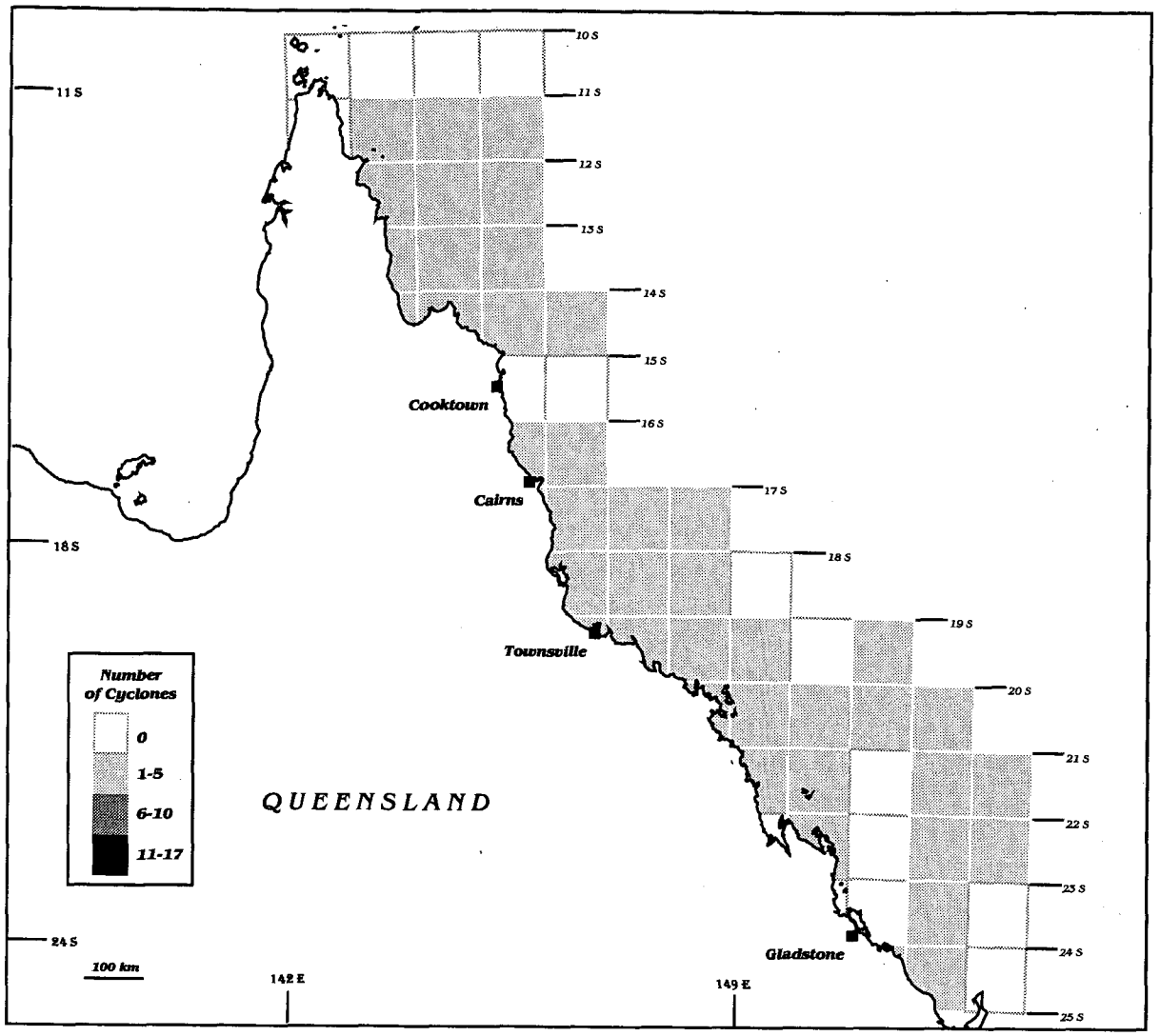


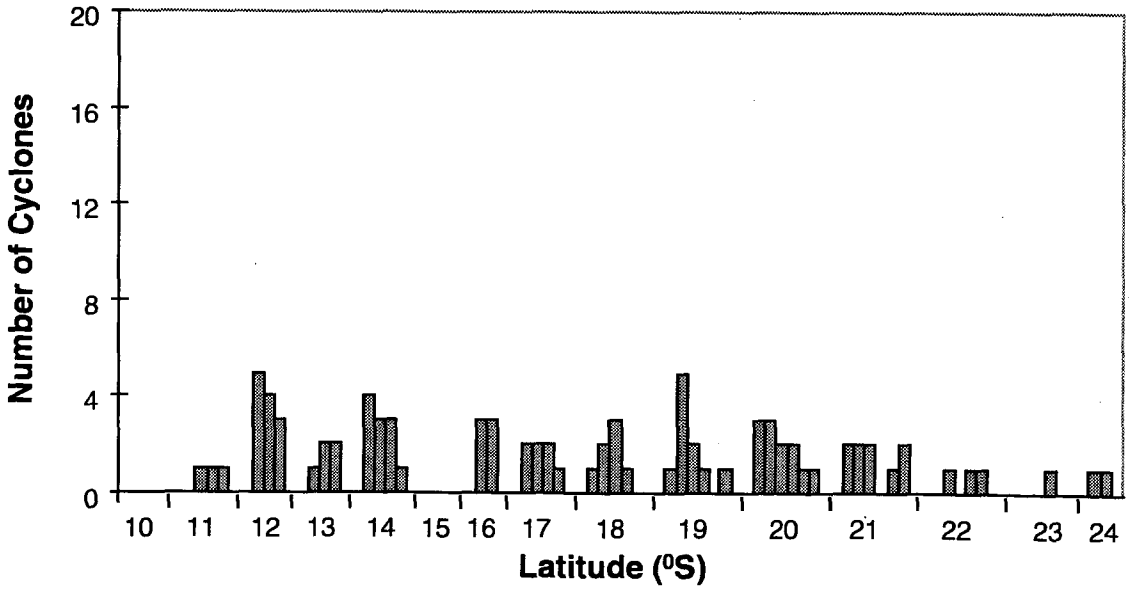
Map 43: *<u>All cyclones in February 1969-1997: total length of cyclone paths</u>. Seperate bars for each latitude depict the values for each 1^0 latitude by 1^0 longitude box.*



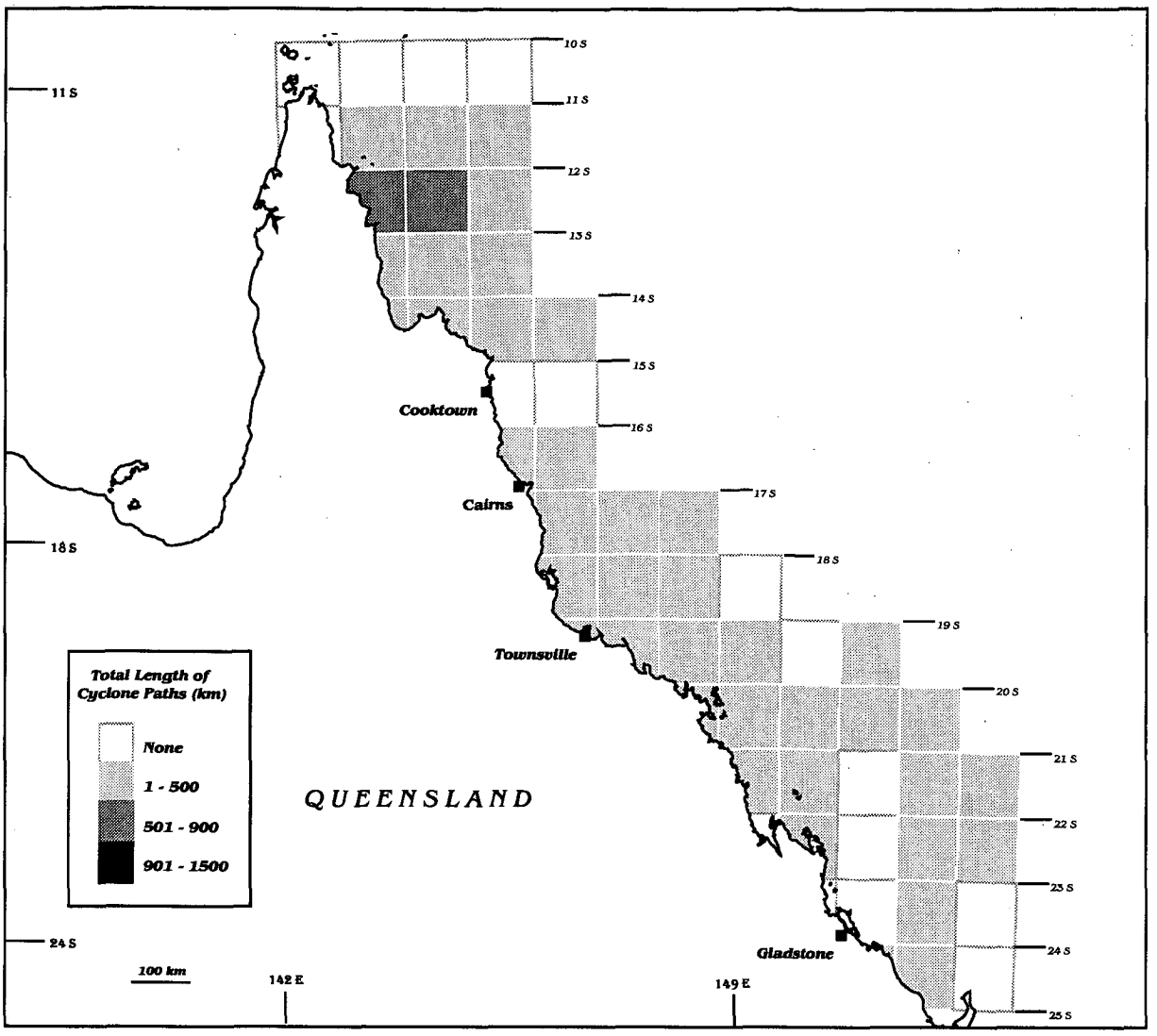


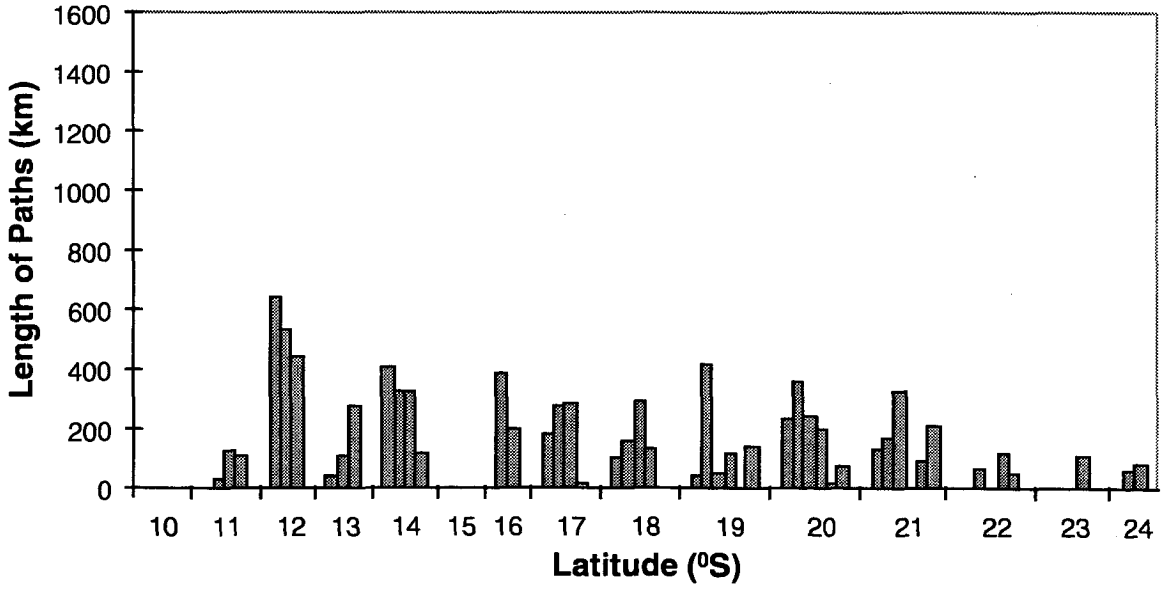
Map 44: *<u>All cyclones in March 1969-1997</u>. Dashed lines represent cyclone paths and shading indicates areas within 100 km of at least one path. The graphs indicate peaks in the number and total path length of all cyclones in March by latitude.*



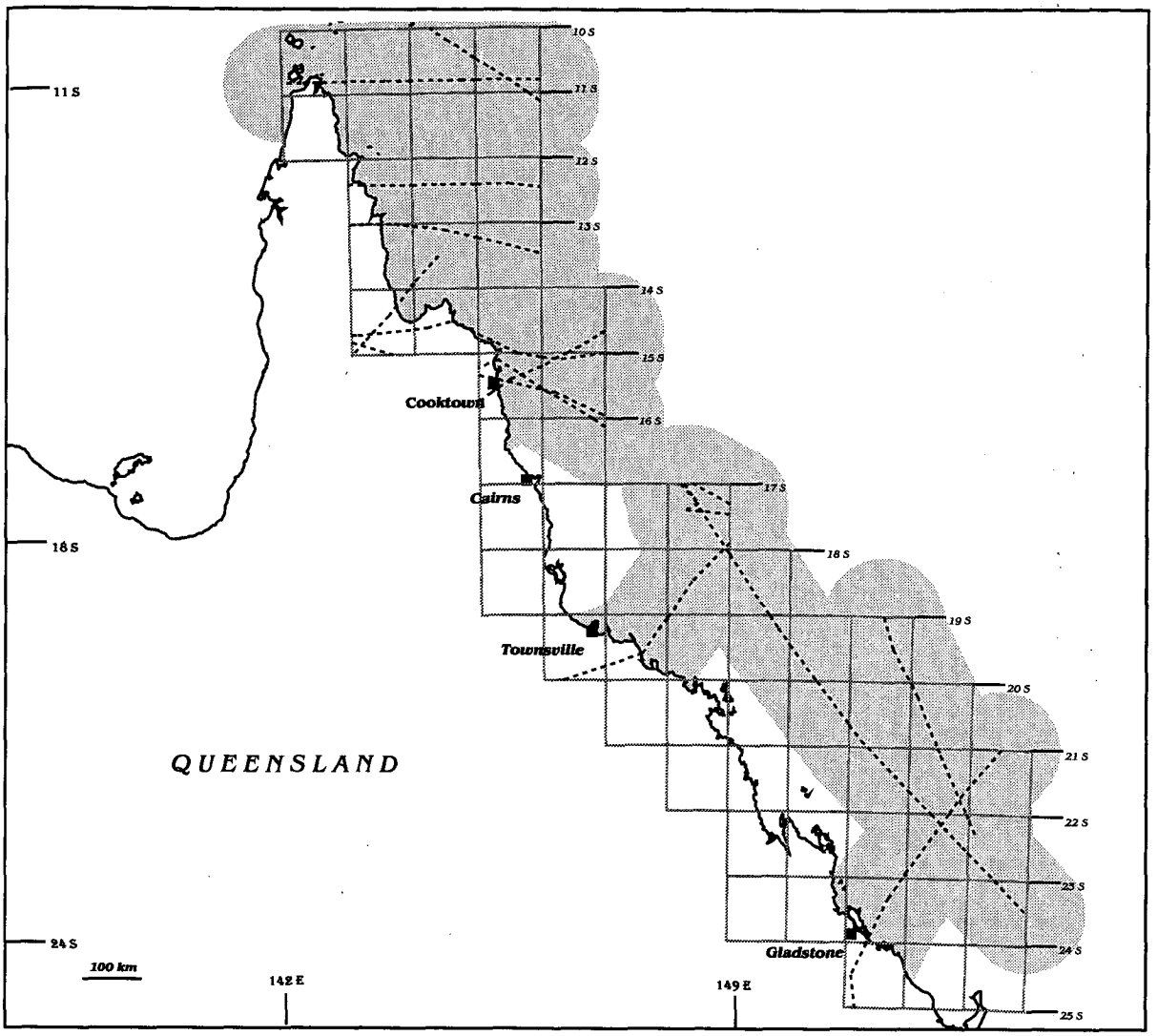


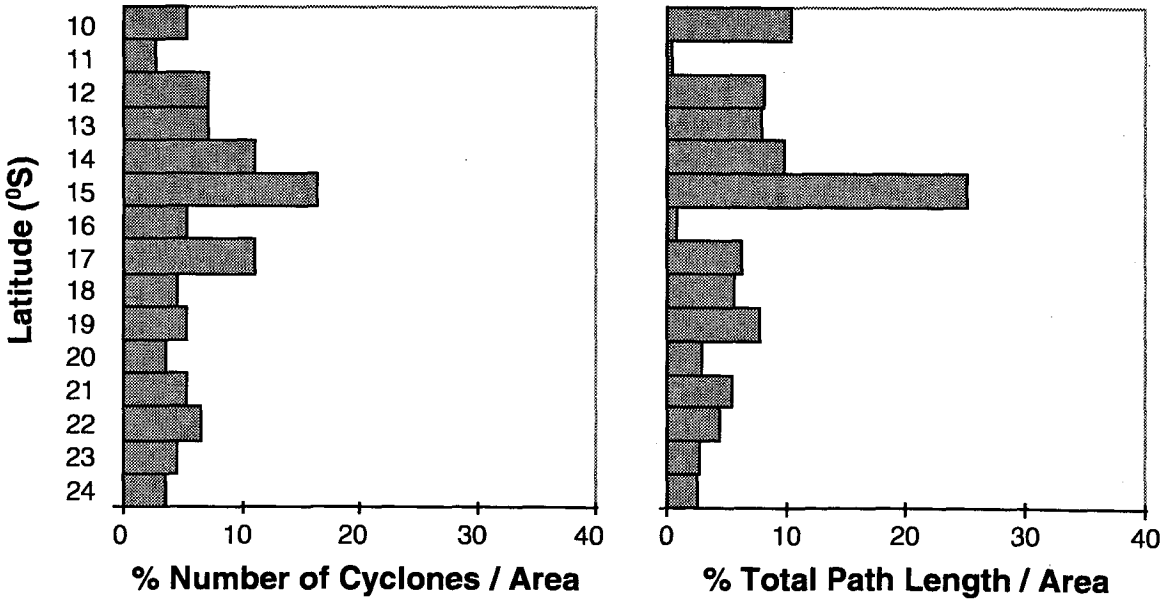
Map 45: *<u>All cyclones in March 1969-1997: number of cyclones</u>. Seperate bars for each latitude depict the values for each 1^0 latitude by 1^0 longitude box.*



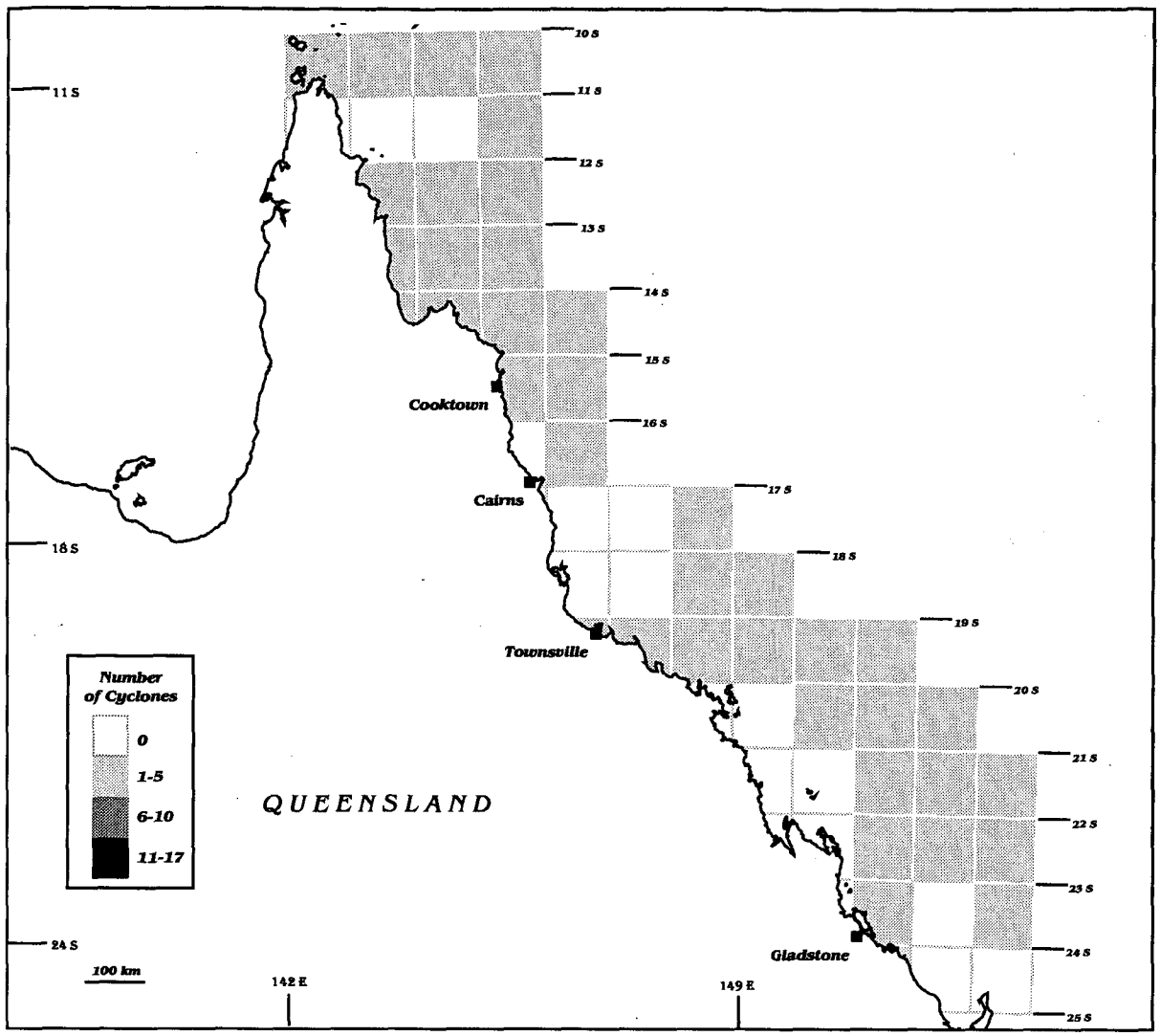


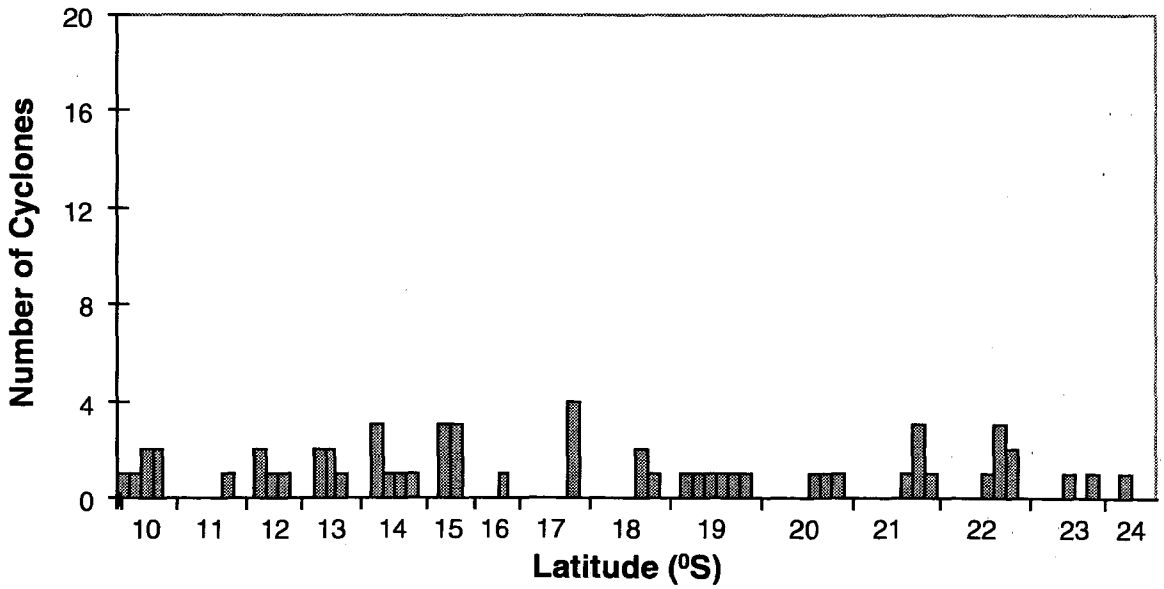
Map 46: *<u>All cyclones in March 1969-1997: total length of cyclone paths</u>. Seperate bars for each latitude depict the values for each 1^0 latitude by 1^0 longitude box.*



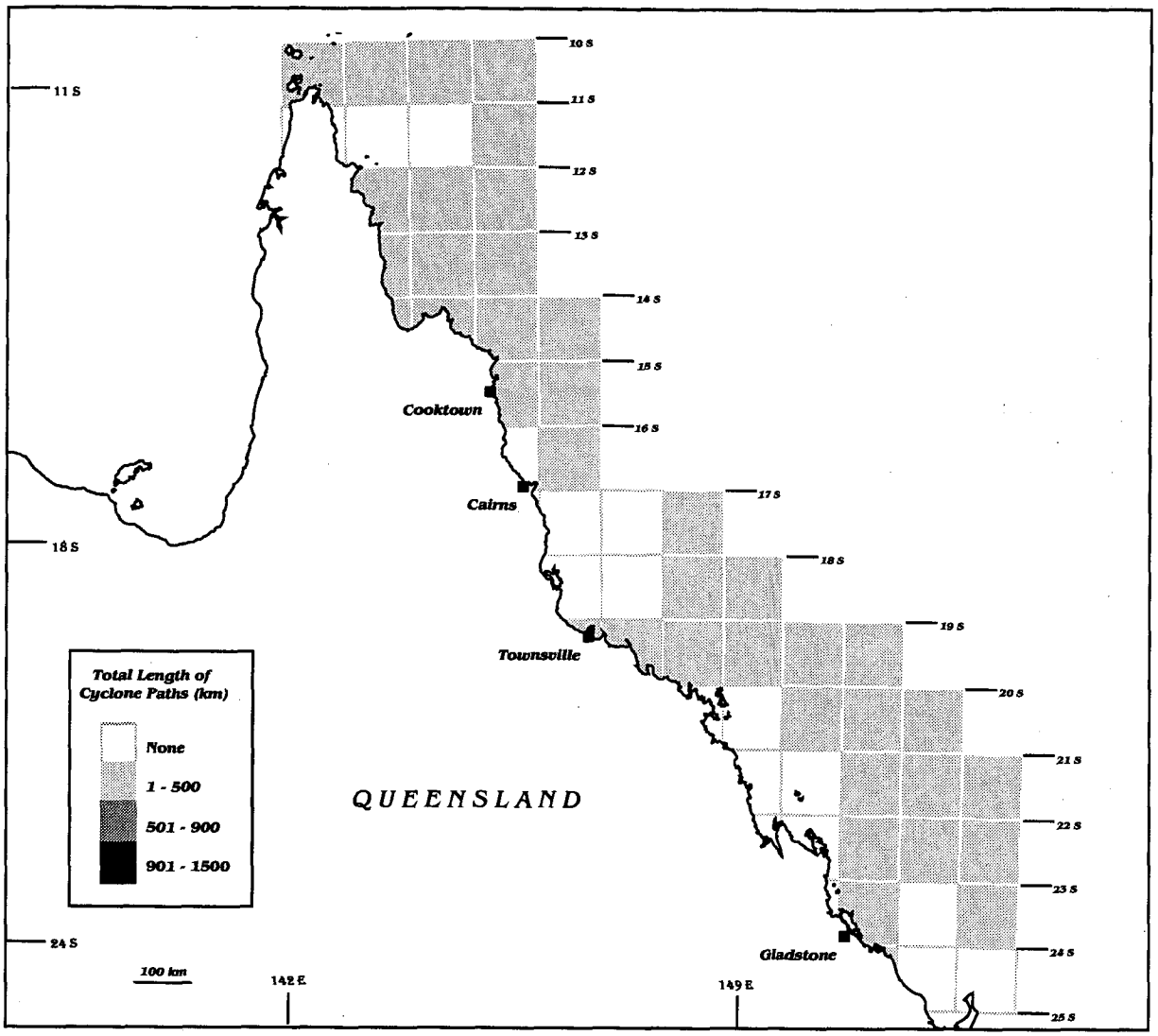


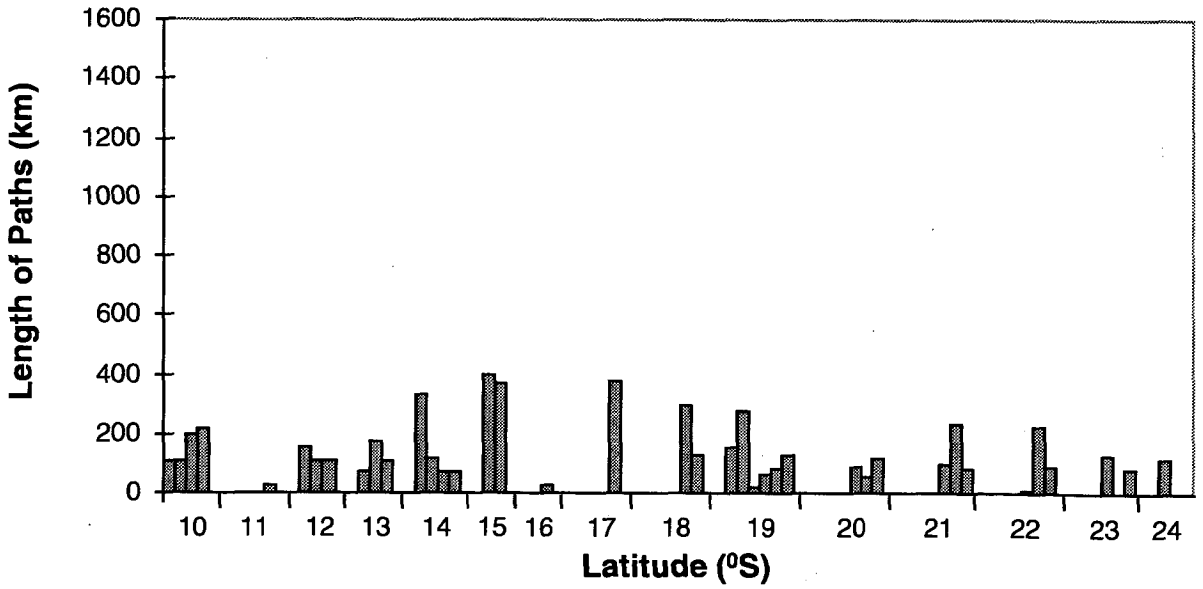
Map 47: *<u>All cyclones in April 1969-1997</u>. Dashed lines represent cyclone paths and shading indicates areas within 100 km of at least one path. The graphs indicate peaks in the number and total path length of all cyclones in April by latitude.*



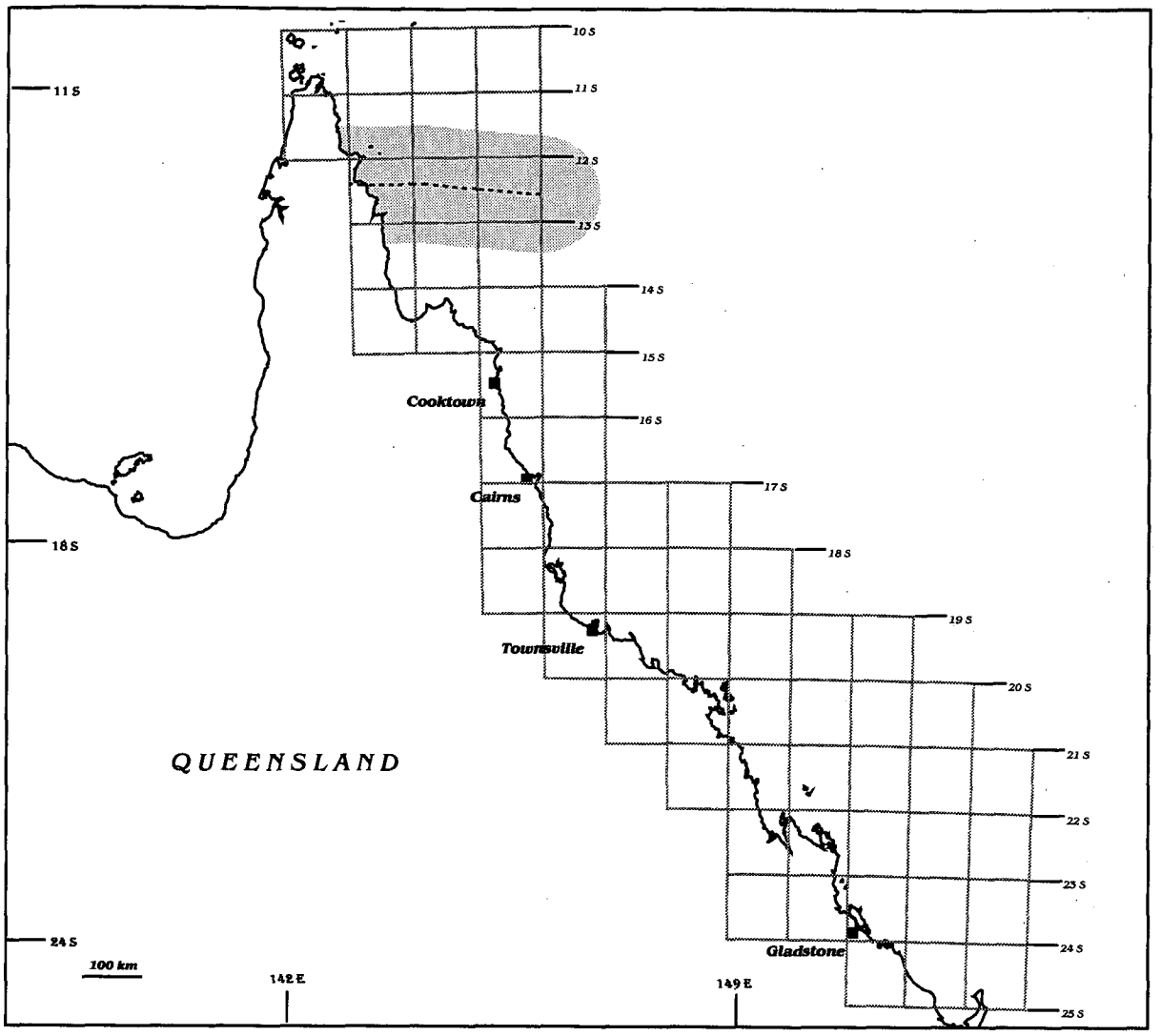


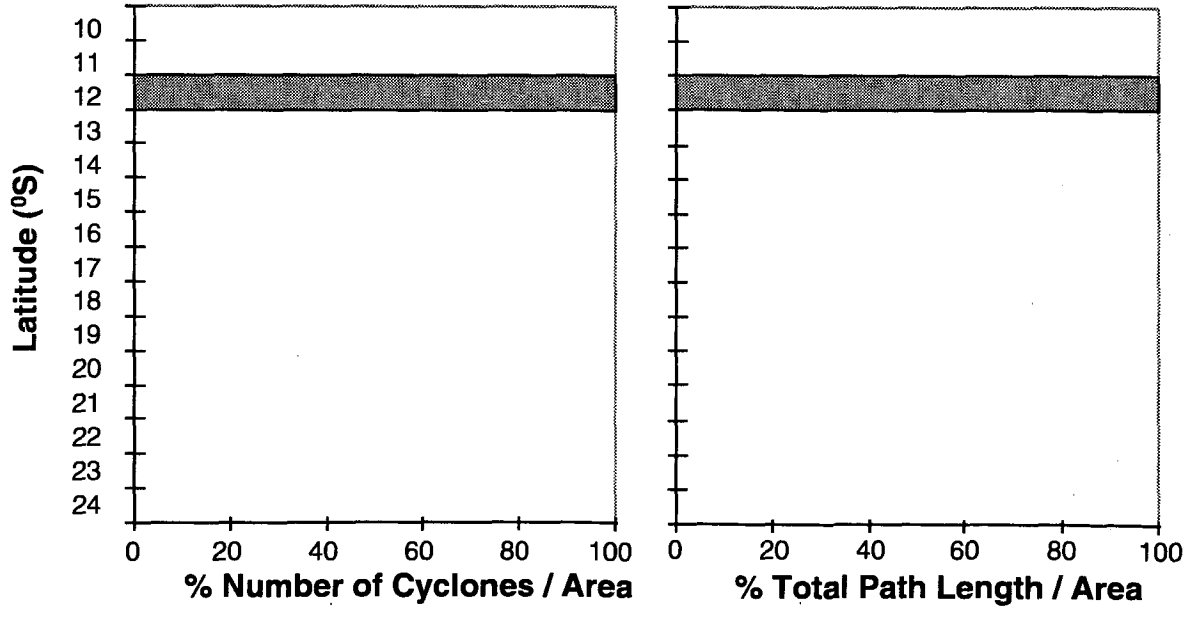
Map 48: *<u>All cyclones in April 1969-1997: number of cyclones</u>. Seperate bars for each latitude depict the values for each 1^0 latitude by 1^0 longitude box.*



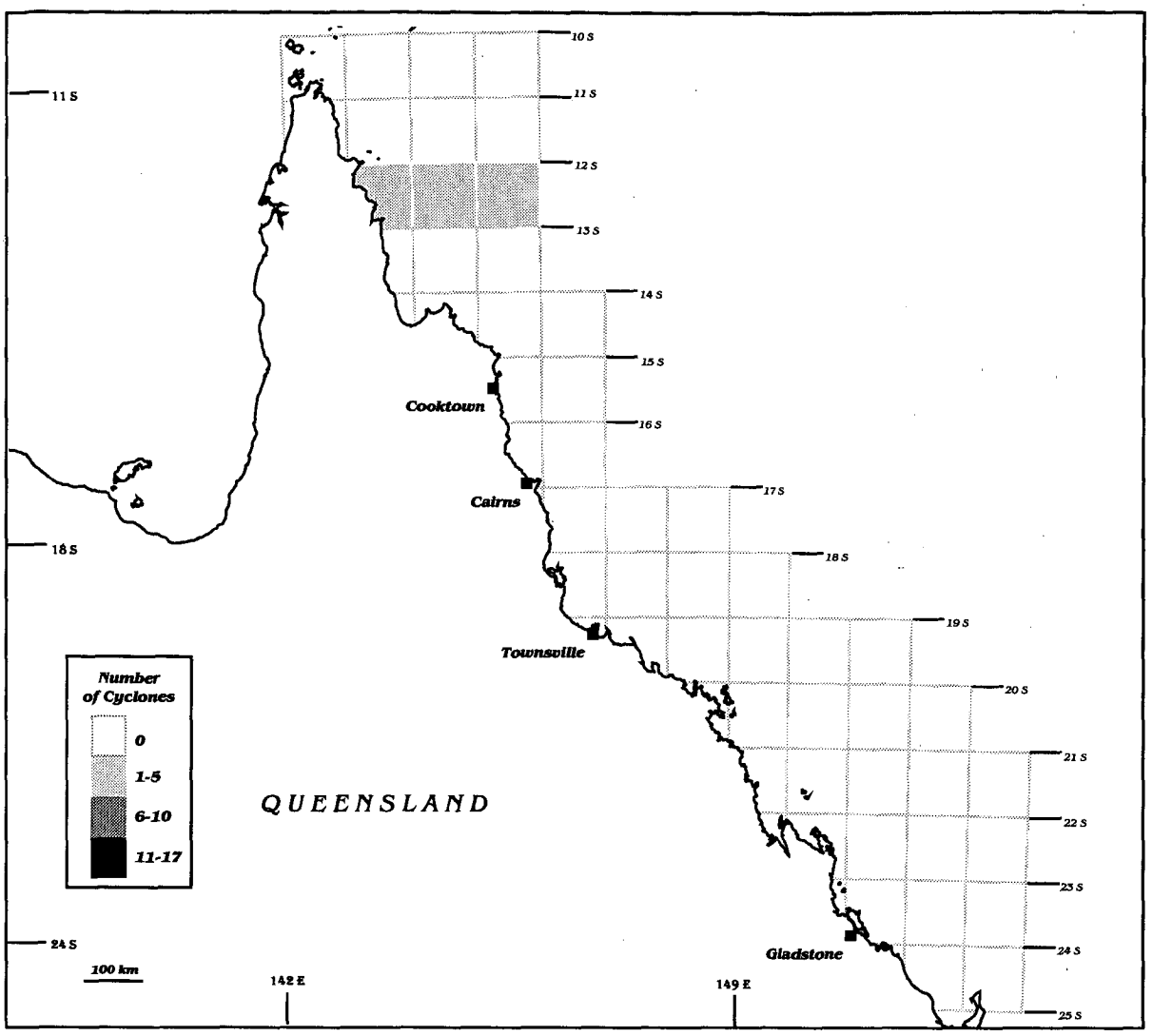


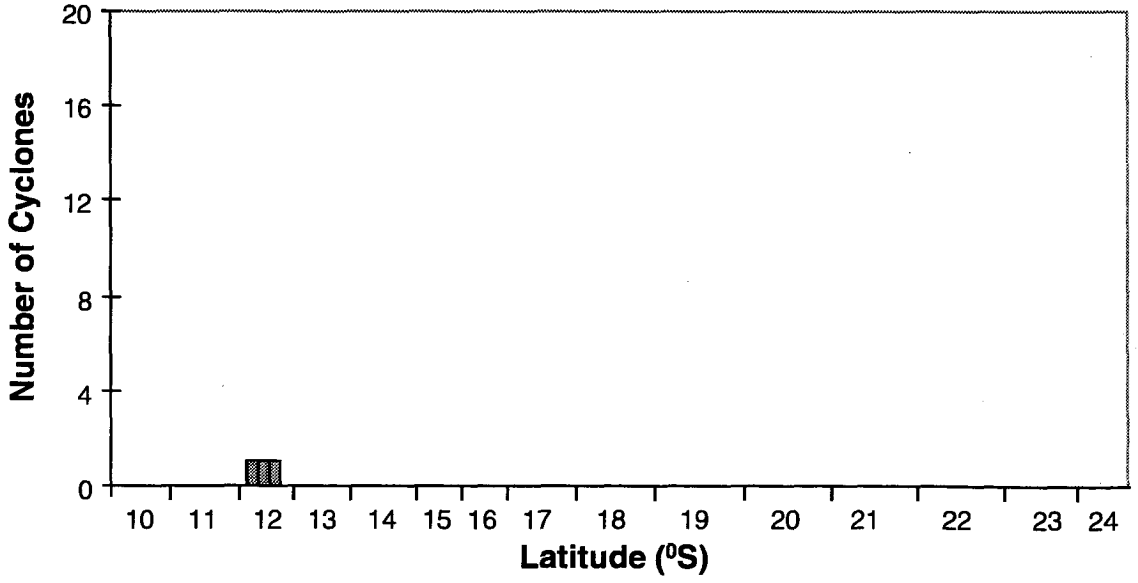
Map 49: *<u>All cyclones in April 1969-1997: total length of cyclone paths</u>. Seperate bars for each latitude depict the values for each 1^0 latitude by 1^0 longitude box.*



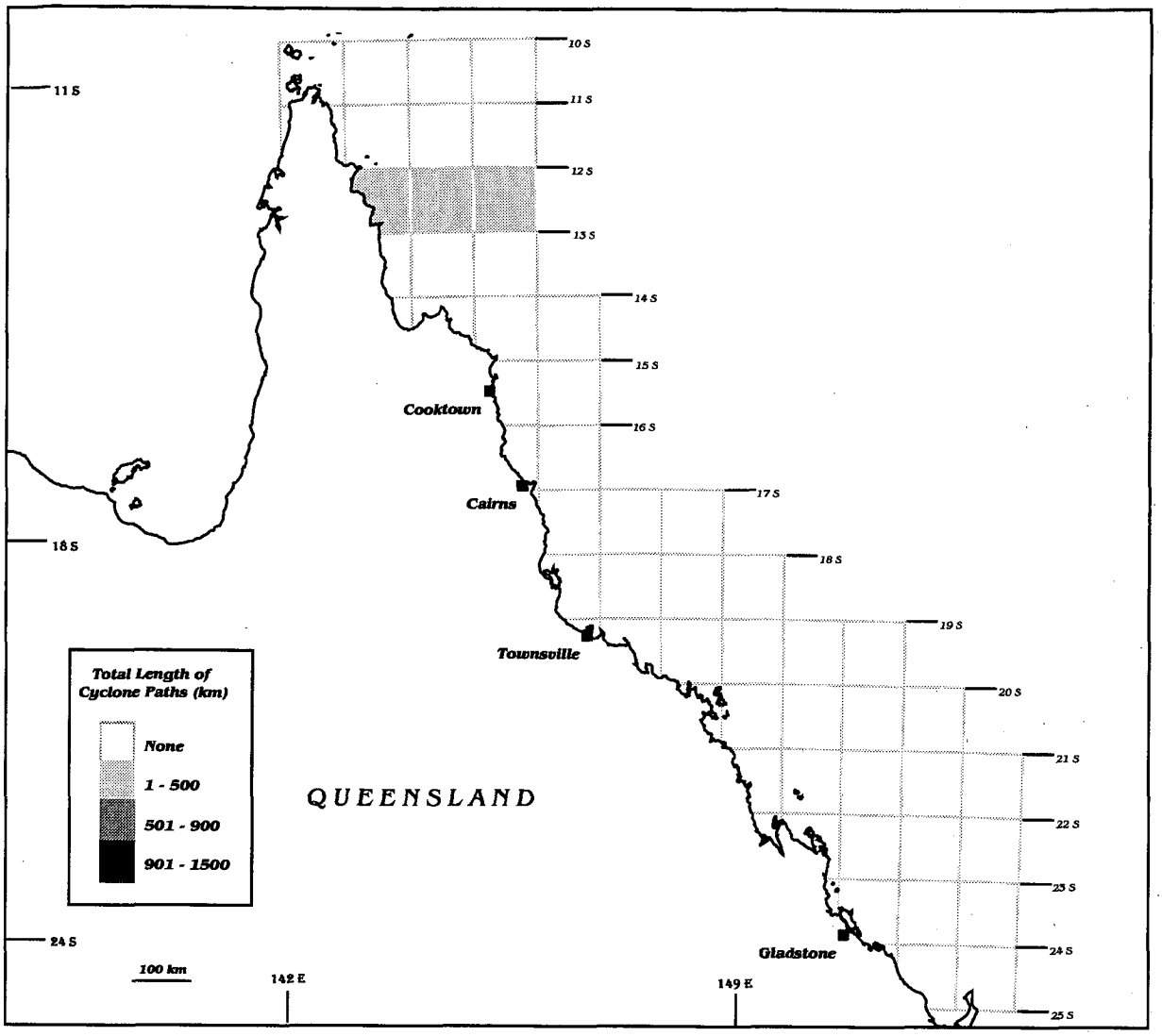


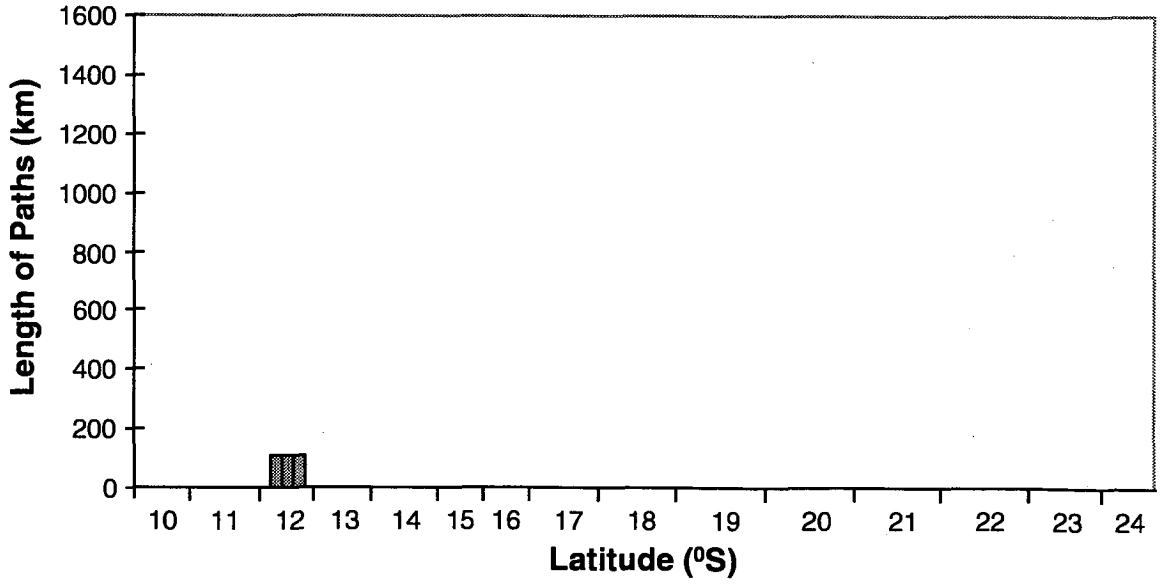
Map 50: *<u>All cyclones in May 1969-1997</u>. Dashed lines represent cyclone paths and shading indicates areas within 100 km of at least one path. The graphs indicate peaks in the number and total path length of all cyclones in May by latitude.*



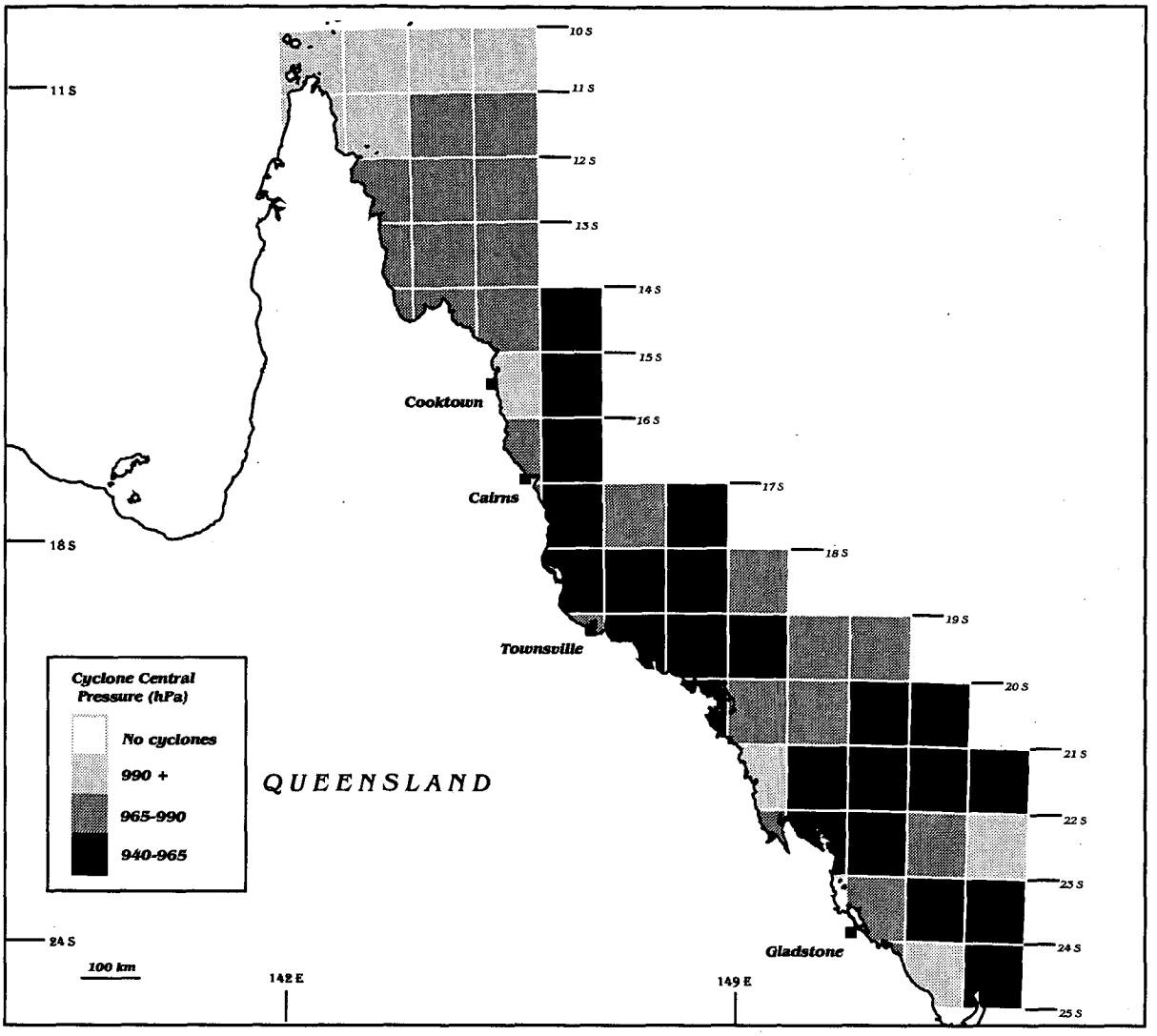


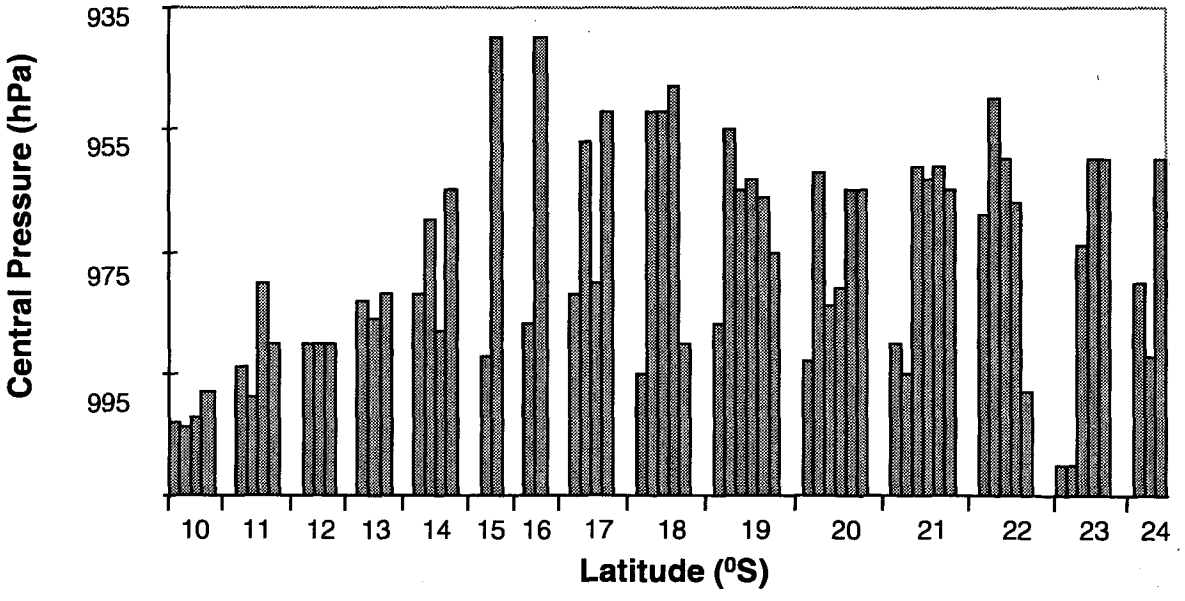
Map 51: *<u>All cyclones in May 1969-1976: number of cyclones</u>. Seperate bars for each latitude depict the values for each 1^0 latitude by 1^0 longitude box.*



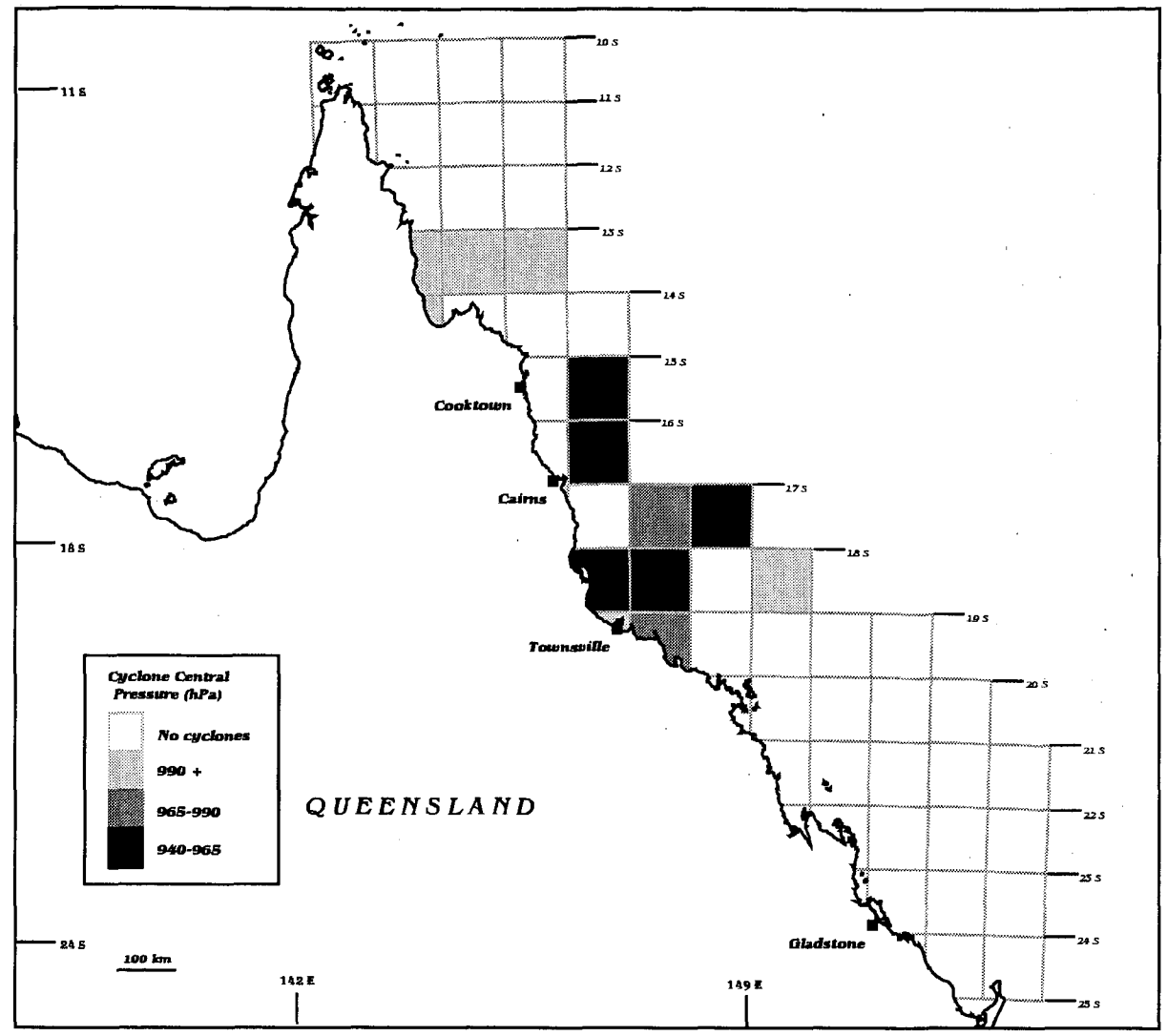


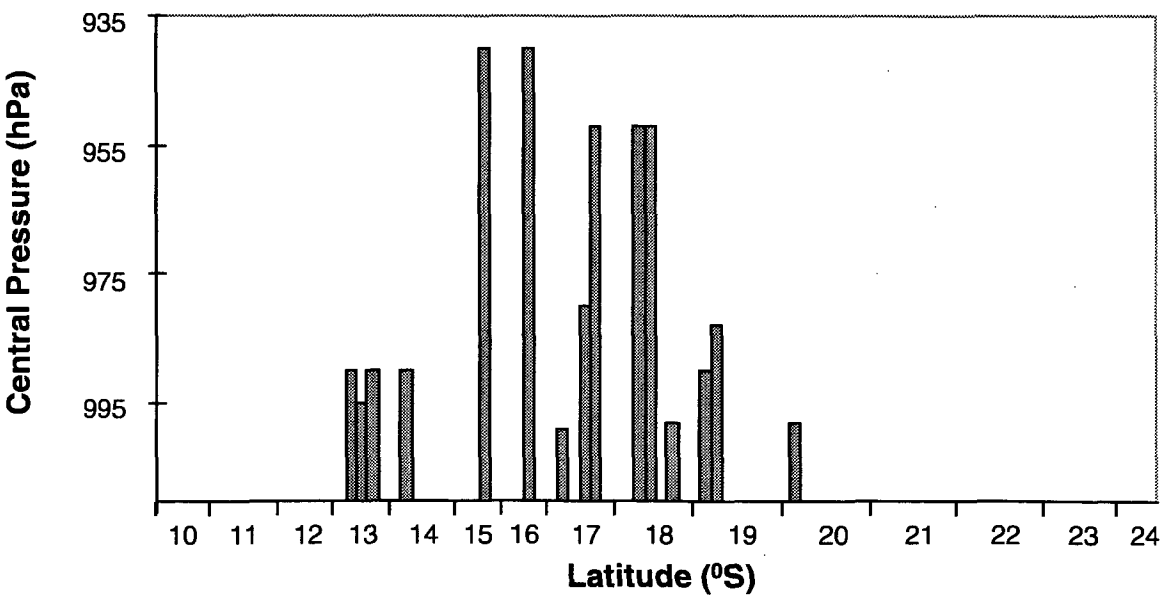
Map 52: *<u>All cyclones in May 1969-1997: total length of cyclone paths</u>. Seperate bars for each latitude depict the values for each 1^0 latitude by 1^0 longitude box.*



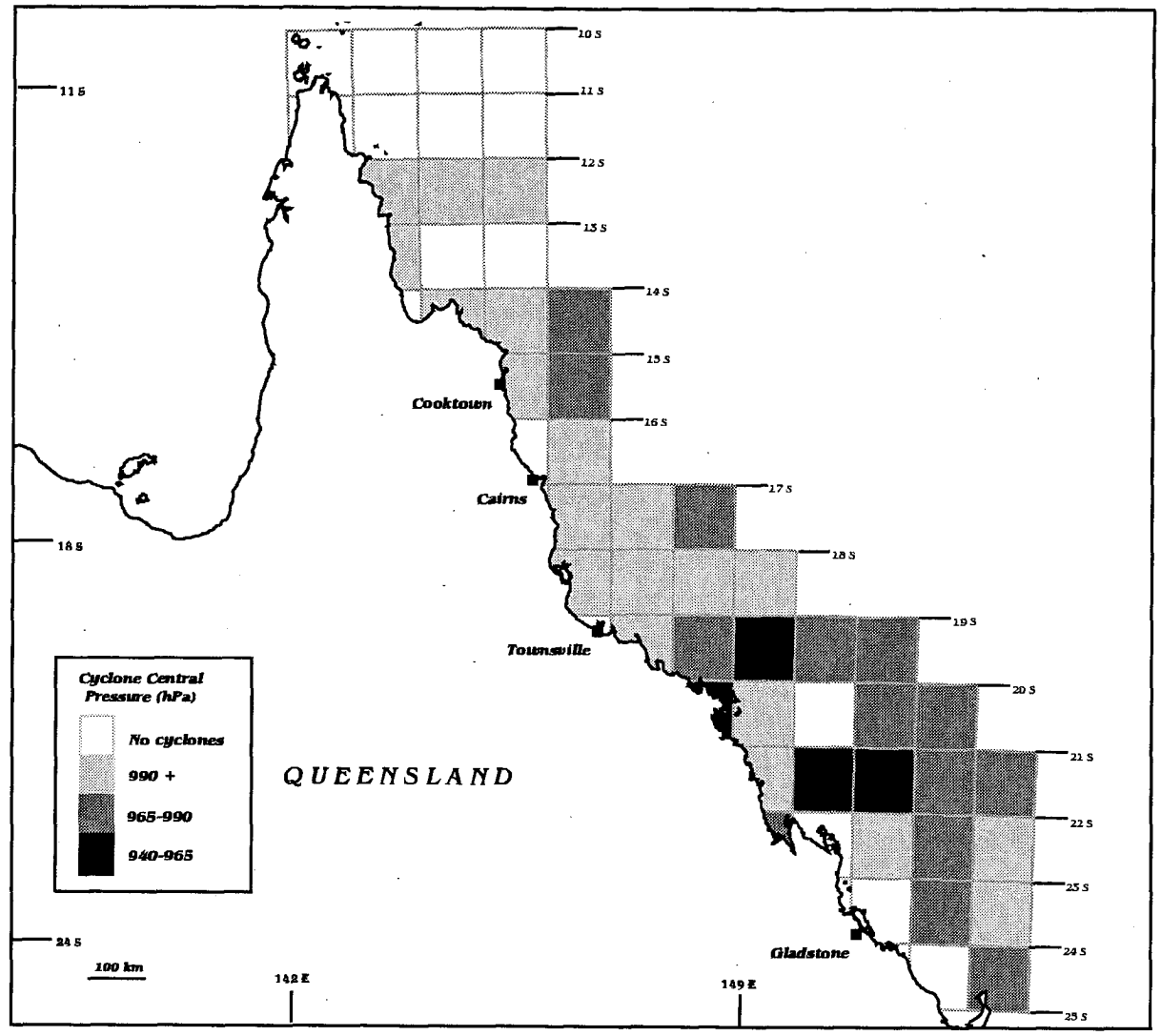


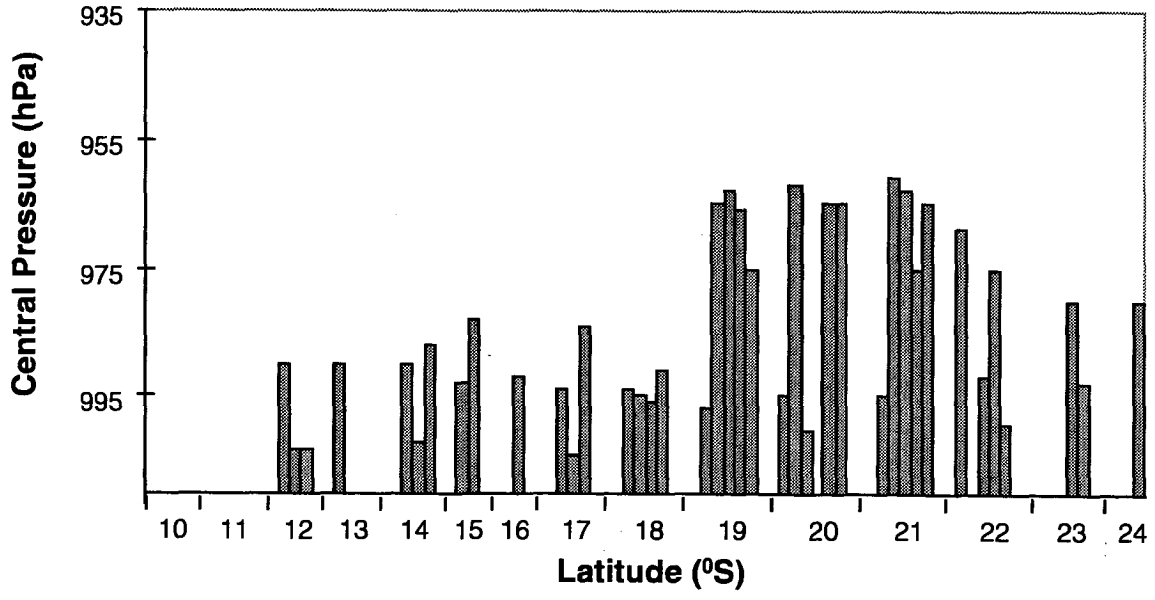
Map 53: *Minimum central pressures recorded in the GBR Region 1969-1997.*



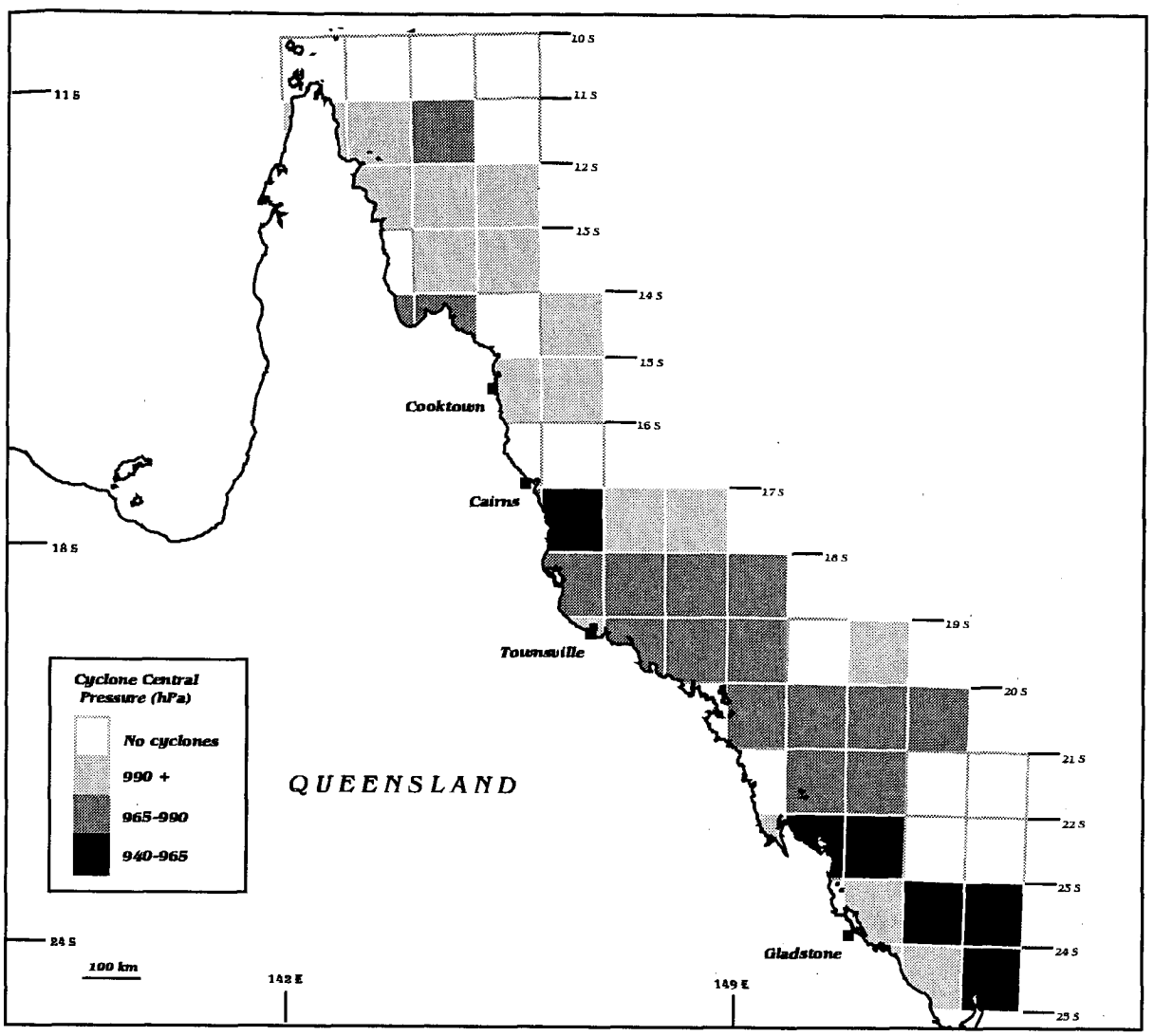


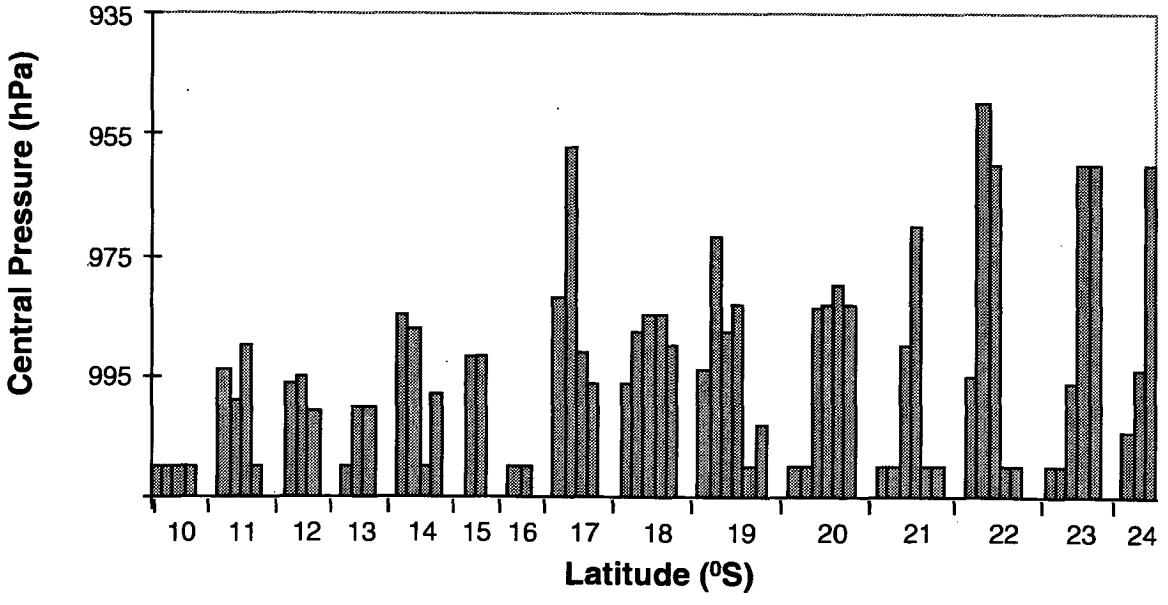
Map 54: *Minimum central pressures recorded in December in the GBR Region 1969-1997.*



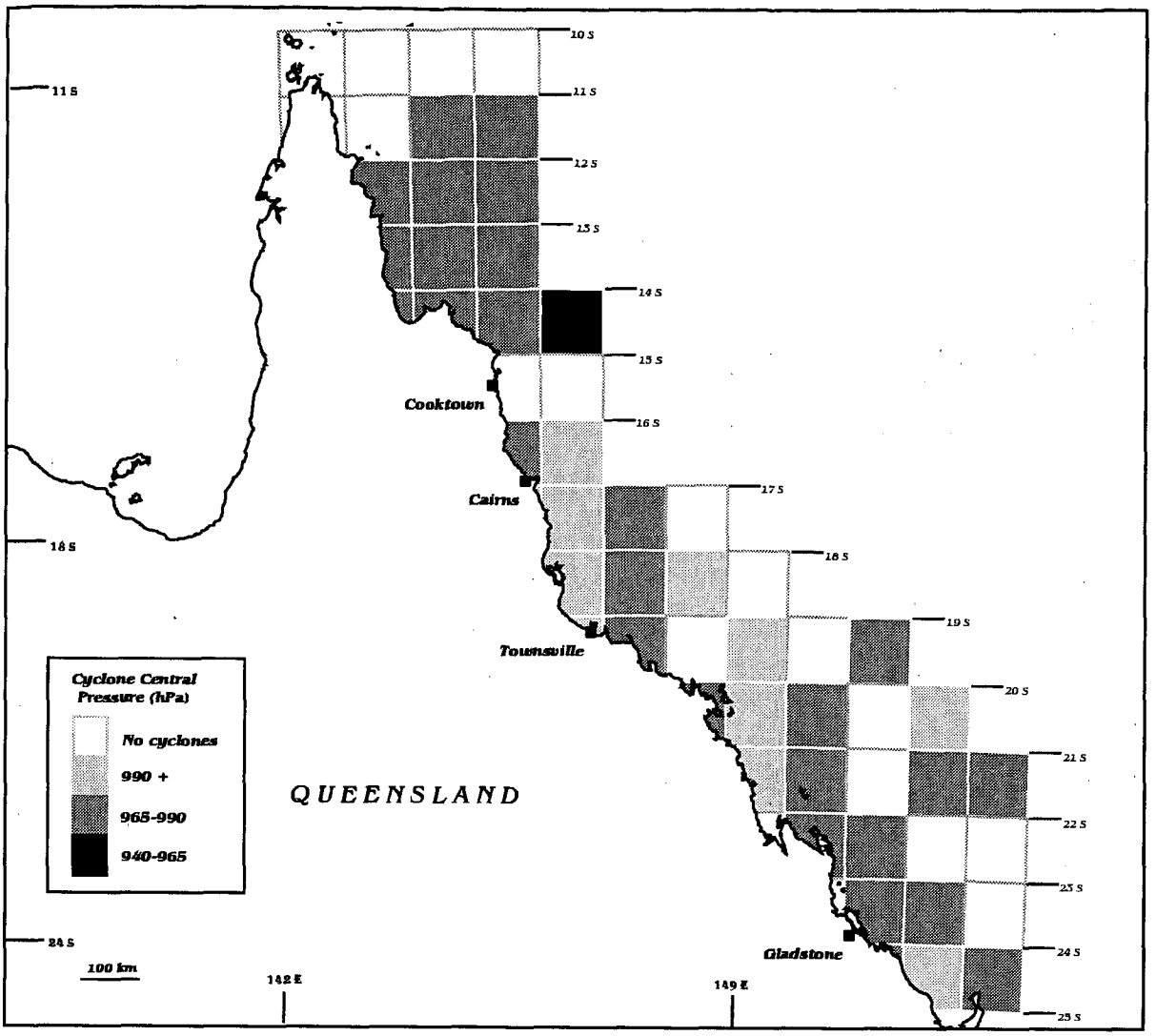


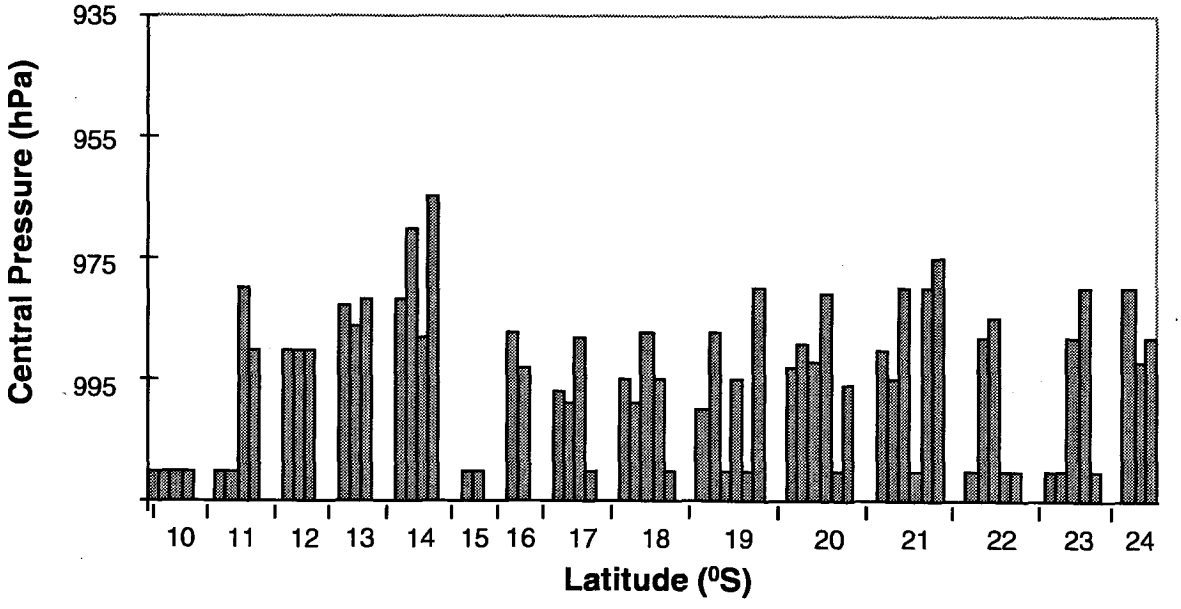
Map 55: *Minimum central pressures recorded in January in the GBR Region 1969-1997.*



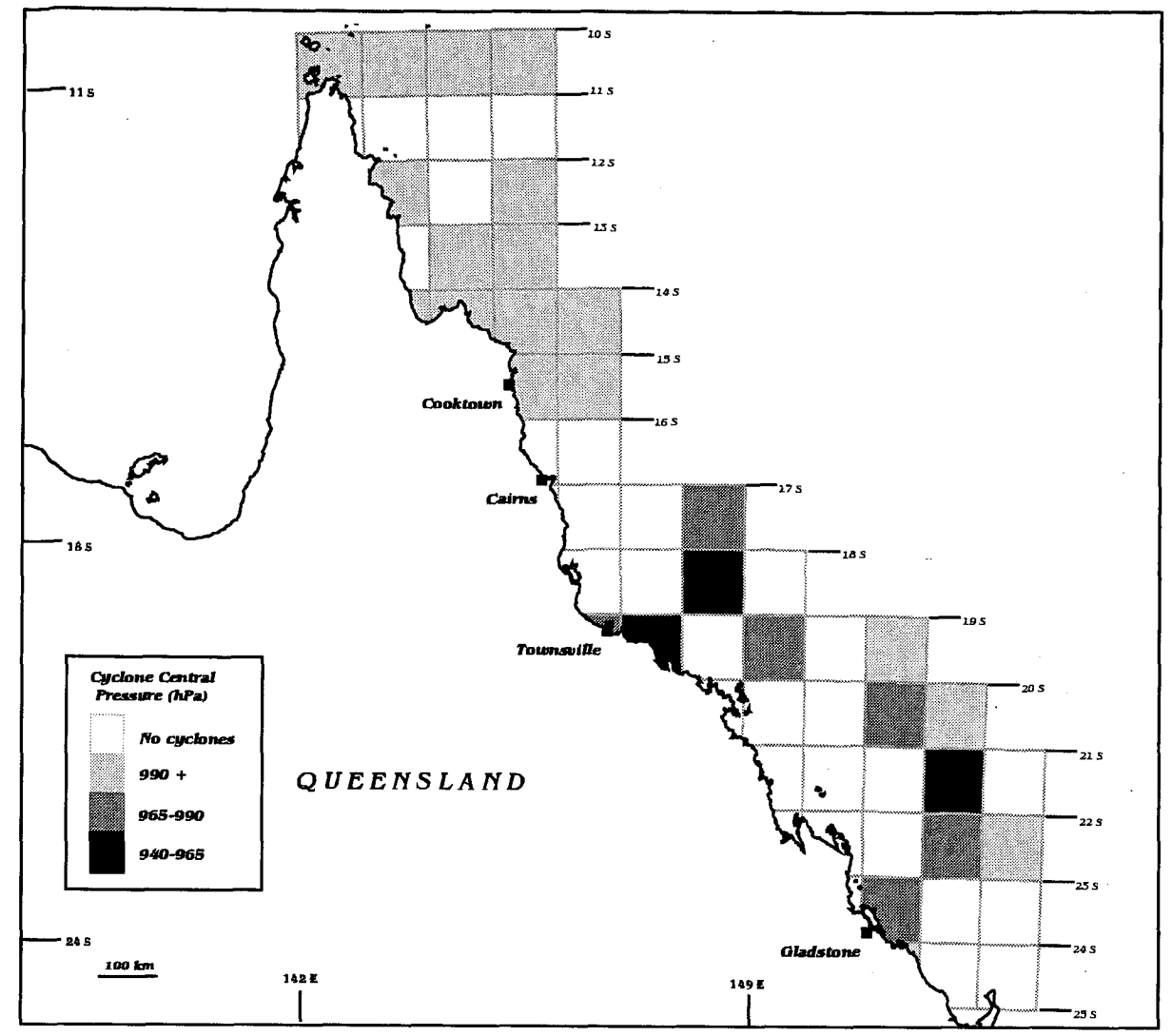


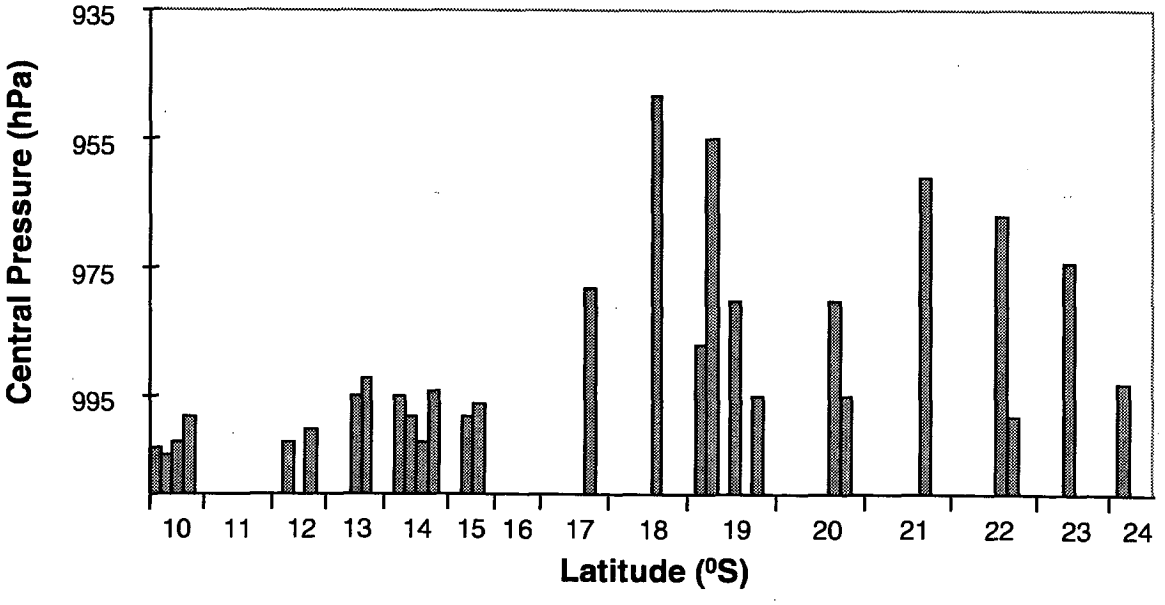
Map 56: *Minimum central pressures recorded in February in the GBR Region 1969-1997.*



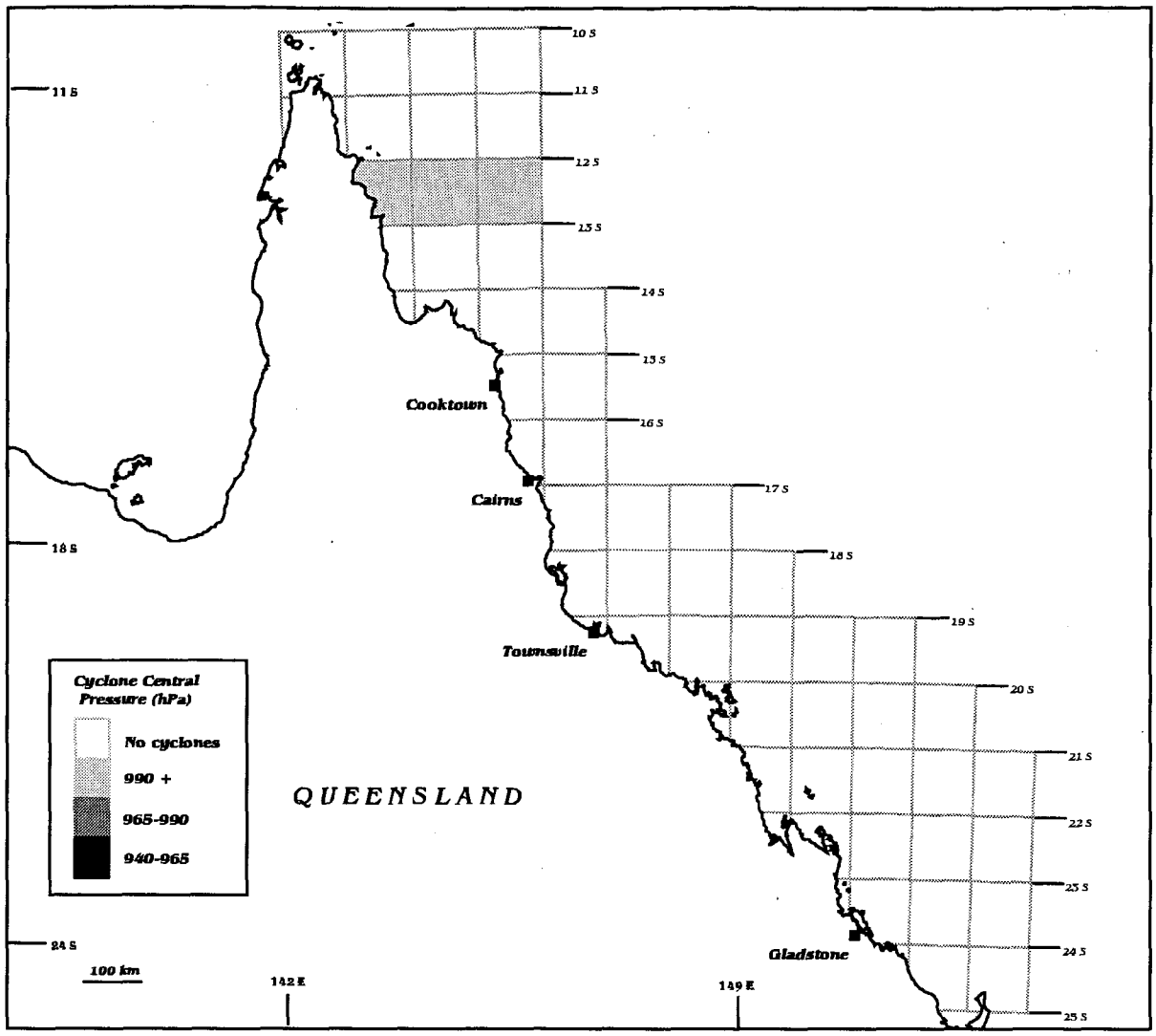


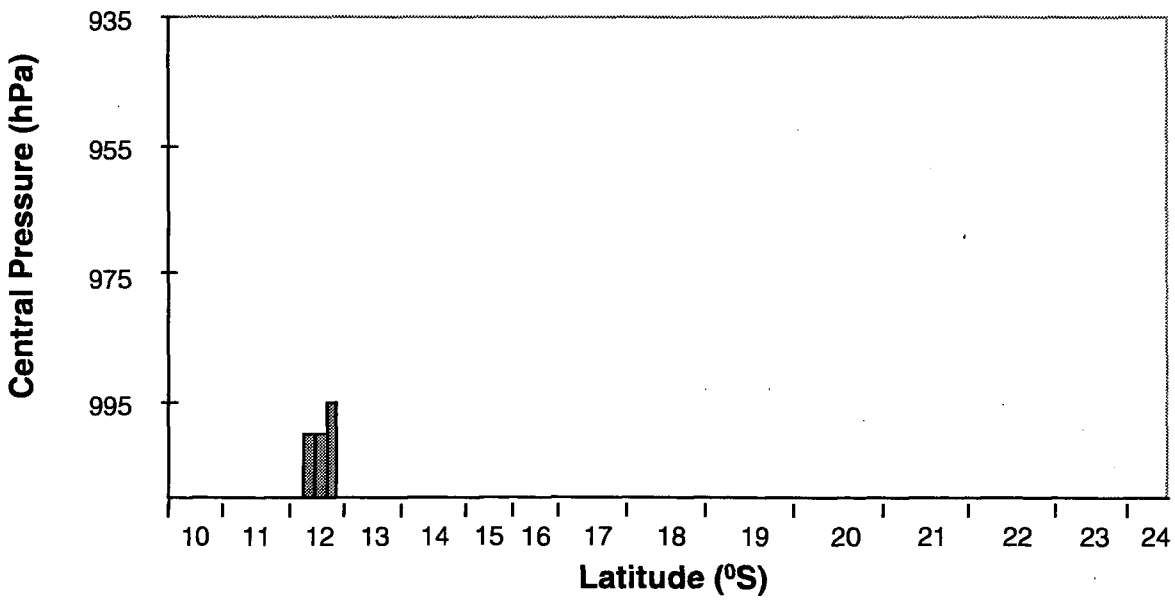
Map 57: *Minimum central pressures recorded in March in the GBR Region 1969-1997.*



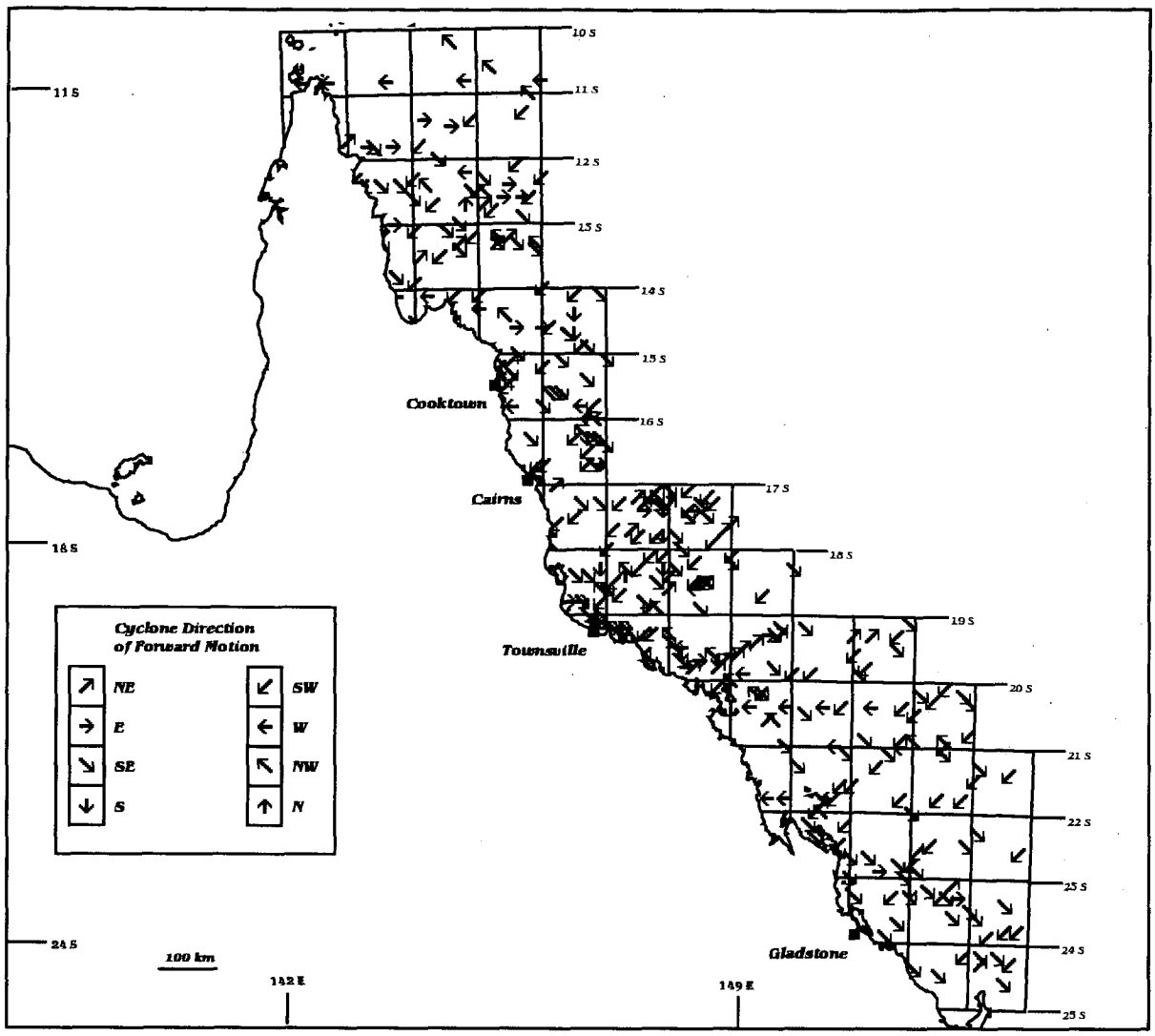


Map 58: *Minimum central pressures recorded in April in the GBR Region 1969-1997.*

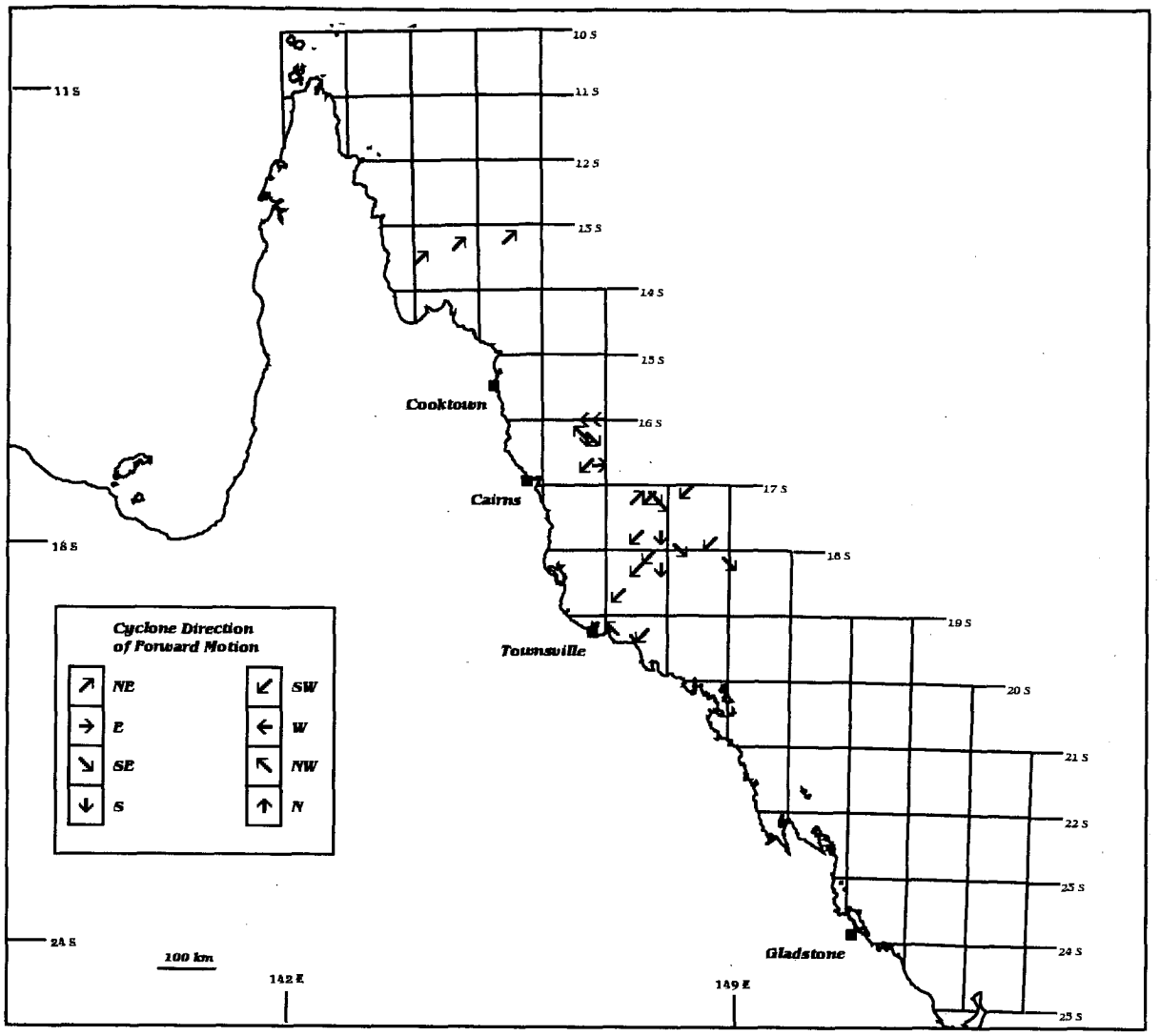




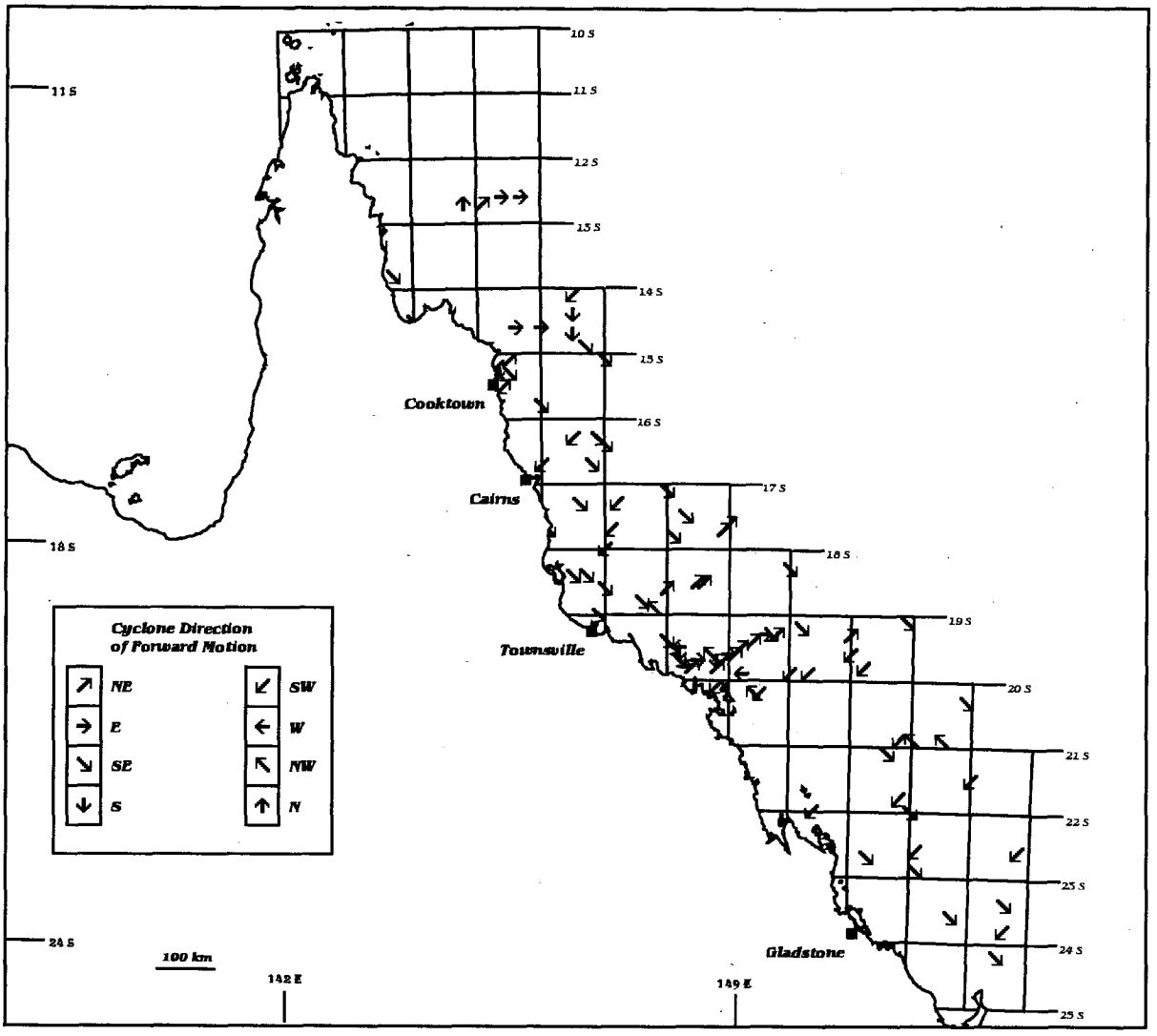
Map 59: *Minimum central pressures recorded in May in the GBR Region 1969-1997.*



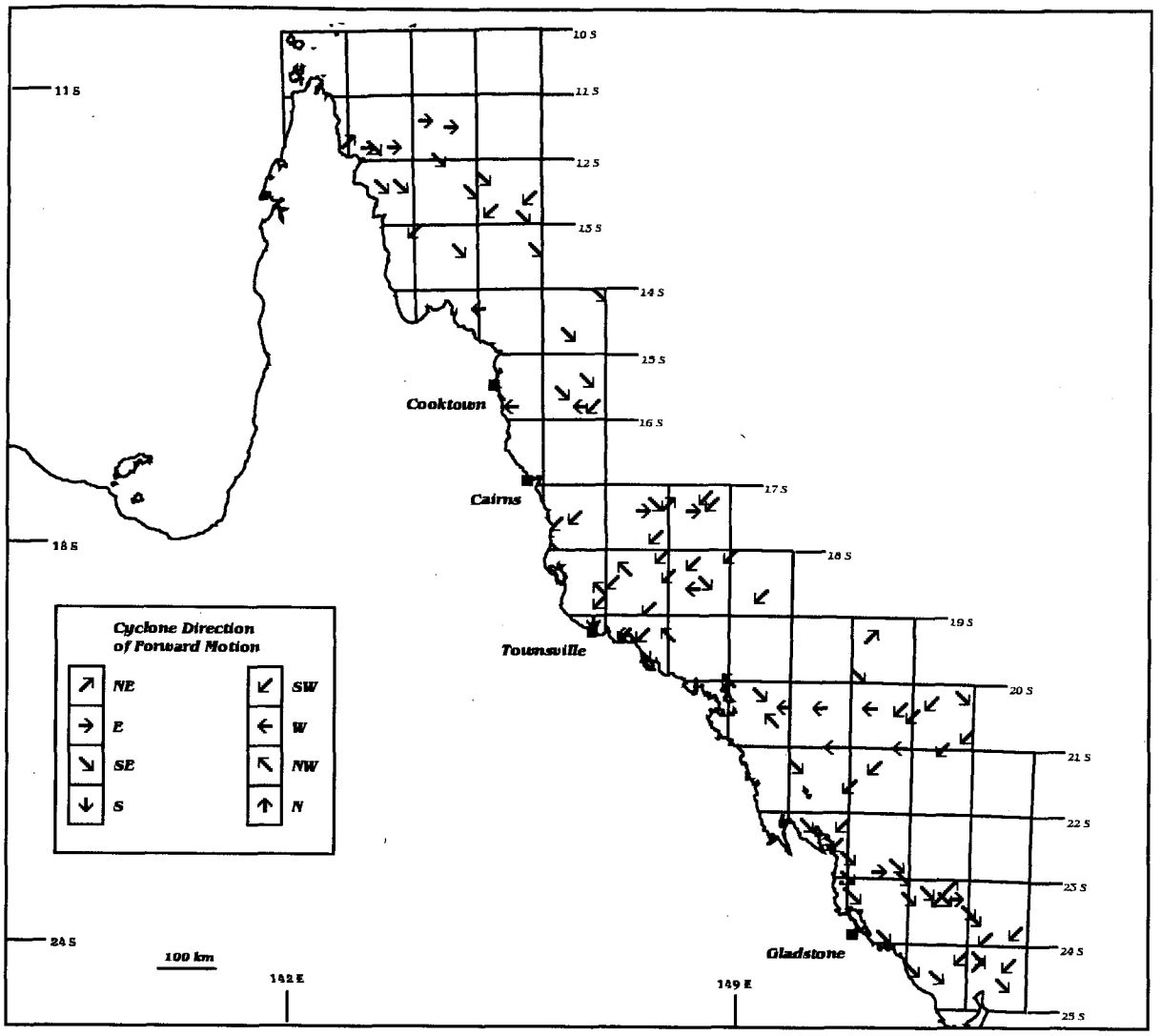
Map 60: *<u>All months: direction of forward motion</u> of cyclones at observed positions 1969-1997.*



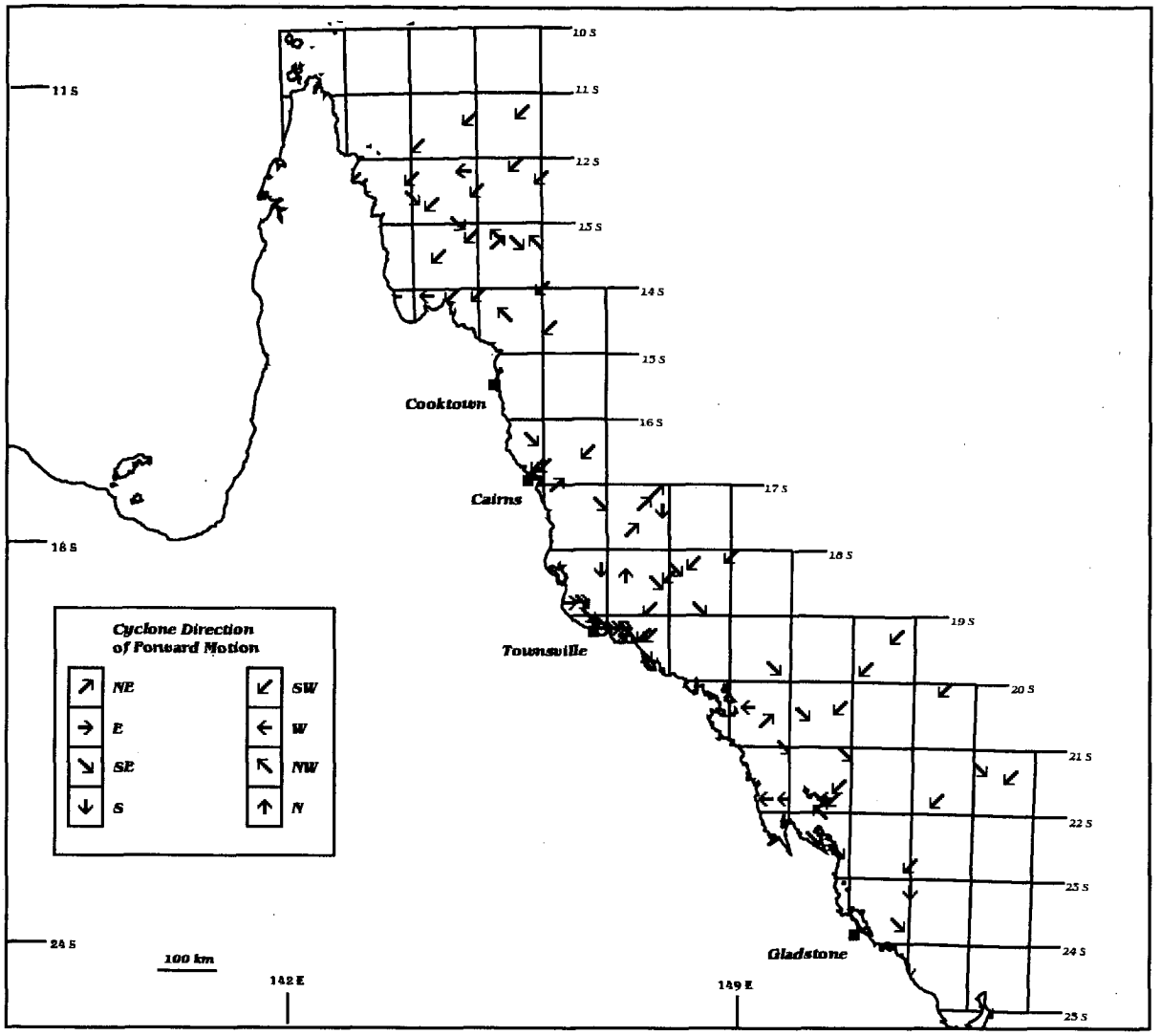
Map 61: *December: direction of forward motion of cyclones at observed positions 1969-1997.*



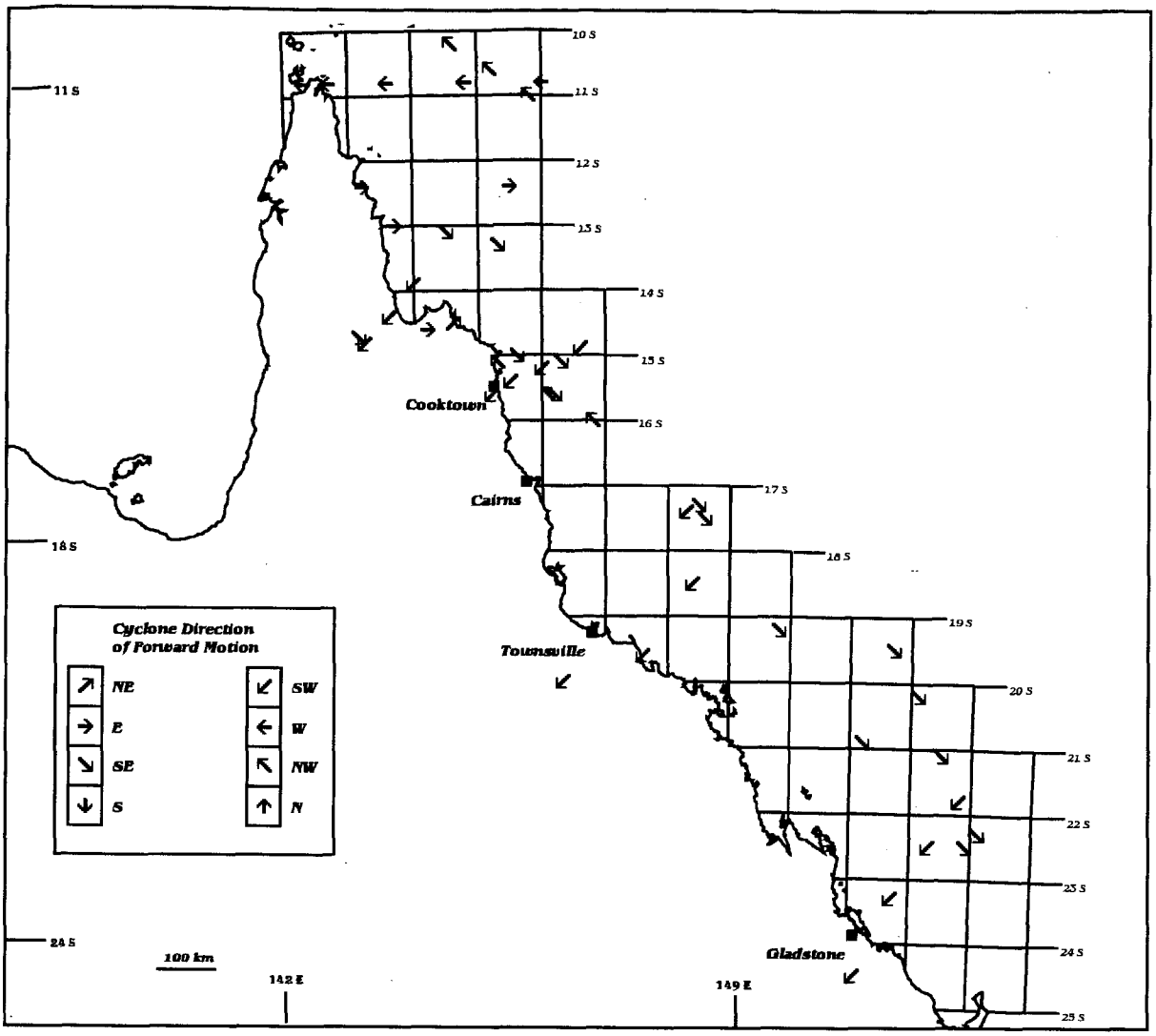
Map 62: *January: direction of forward motion of cyclones at observed positions 1969-1997.*



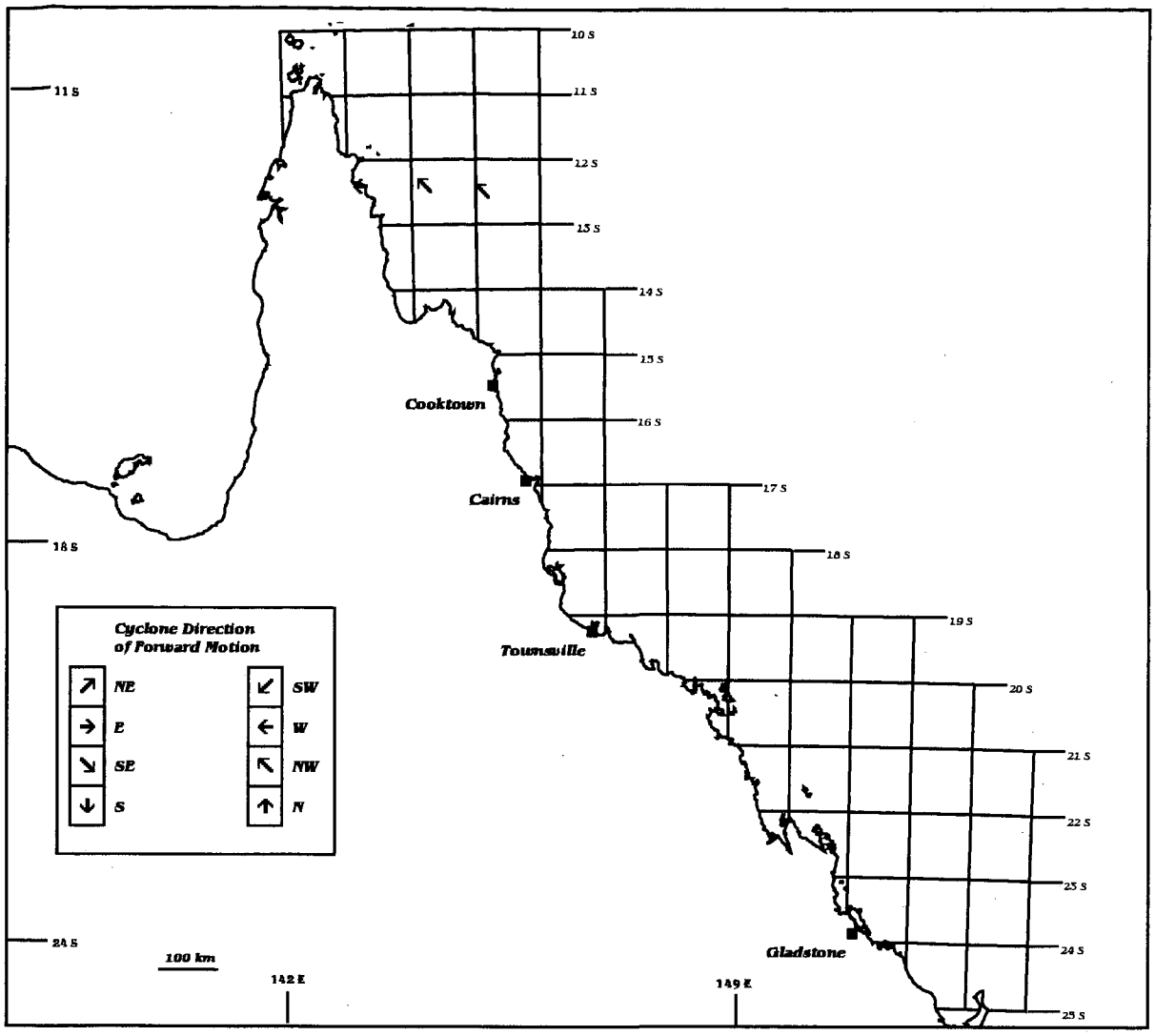
Map 63: *February: direction of forward motion of cyclones at observed positions 1969-1997.*



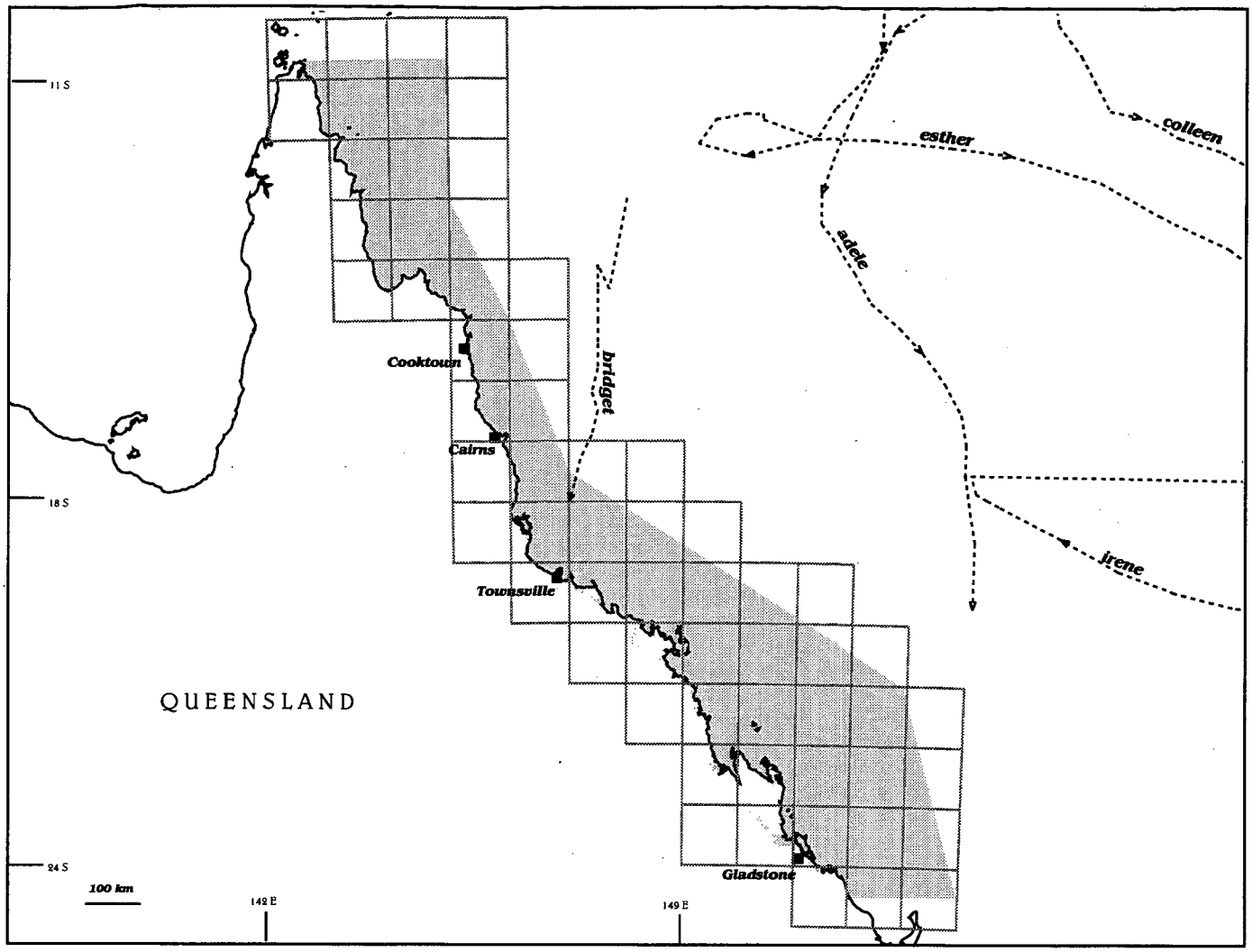
Map 64: *March: direction of forward motion of cyclones at observed positions 1969-1997.*



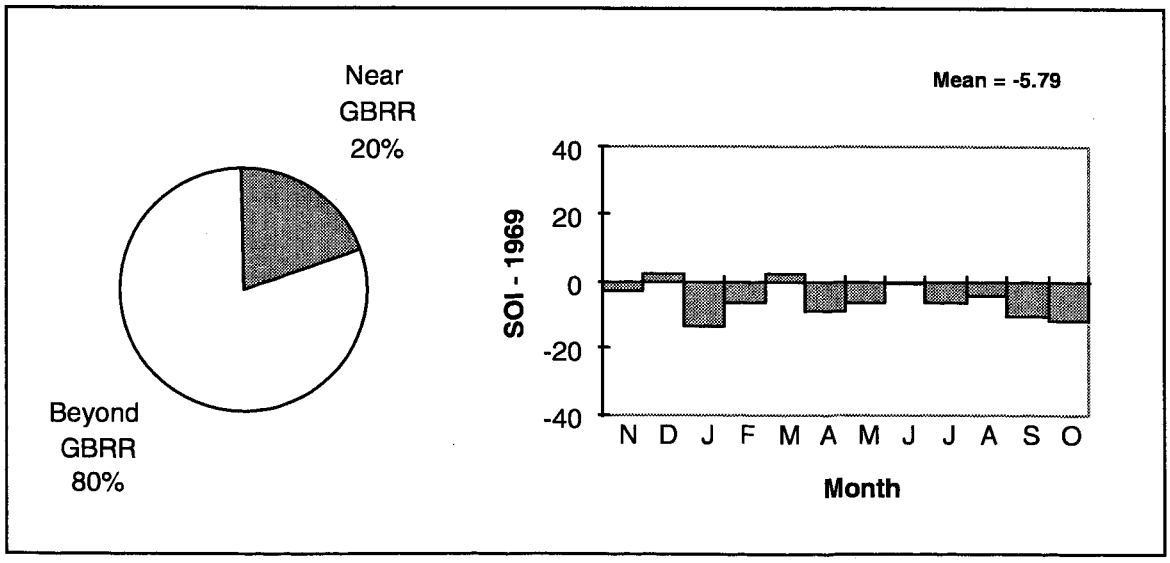
Map 65: *April: direction of forward motion of cyclones at observed positions 1969-1997.*



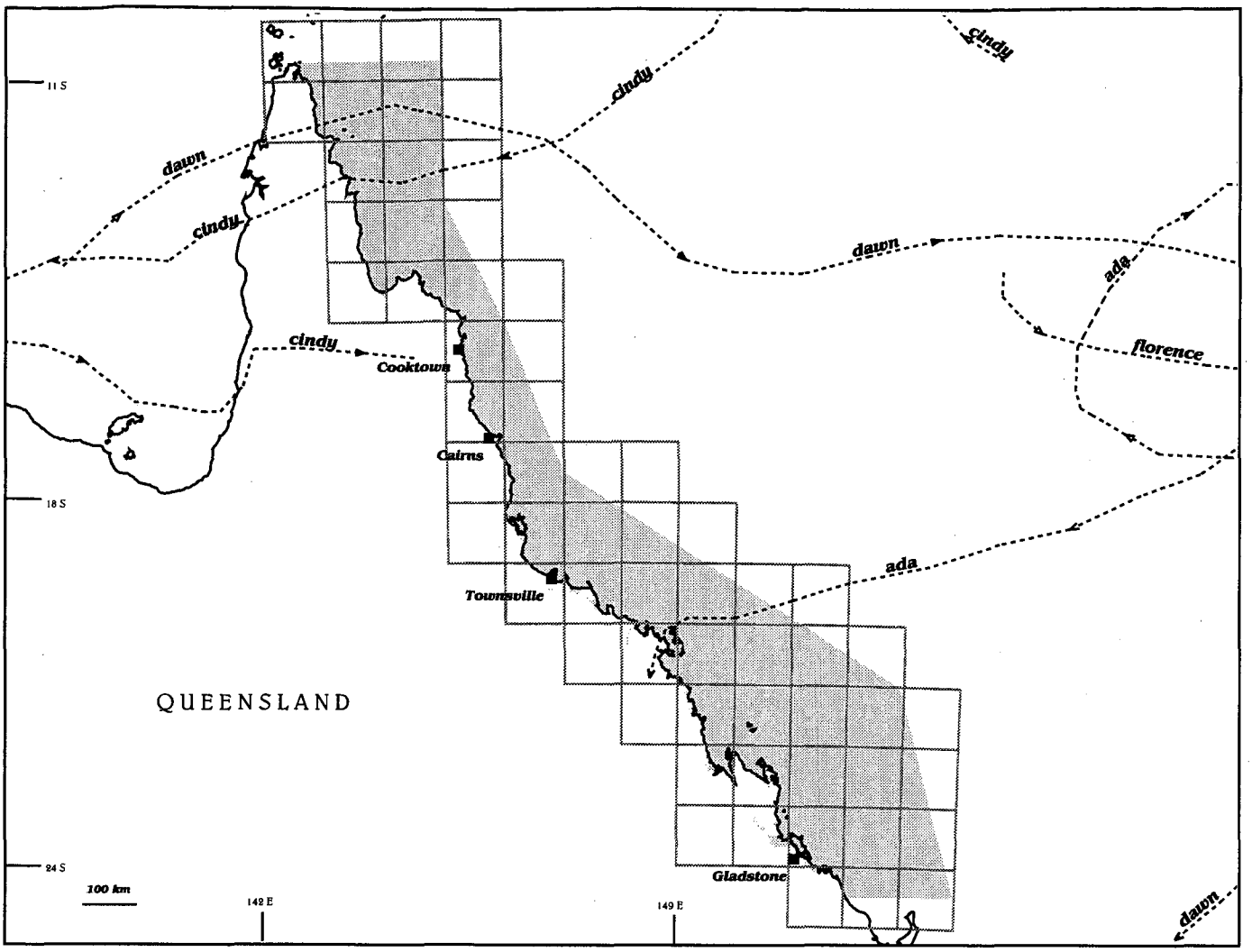
Map 66: *May: direction of forward motion of cyclones at observed positions 1969-1997.*



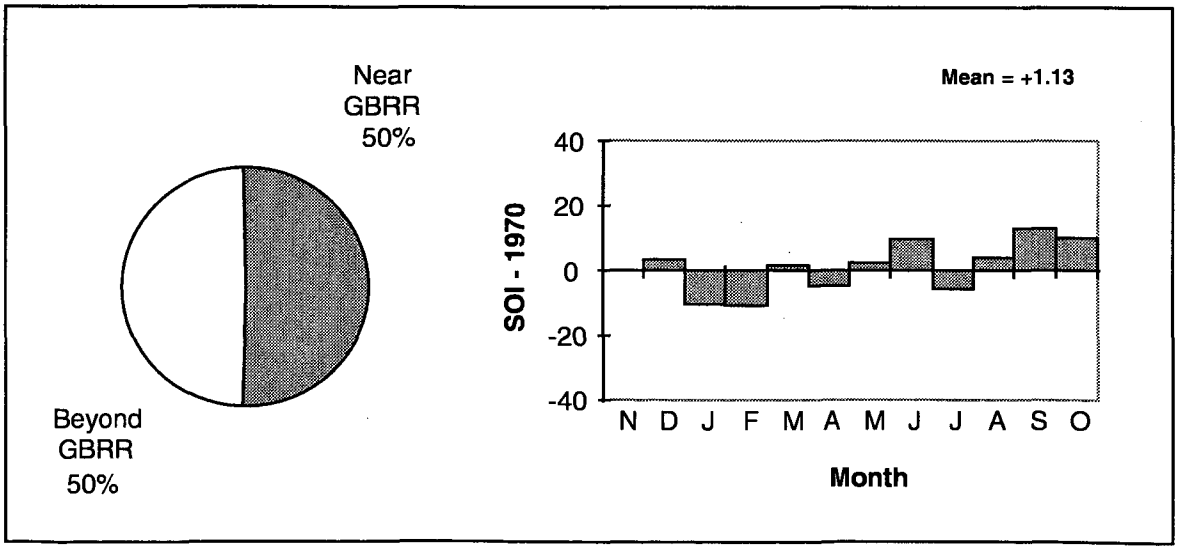
1968-1969



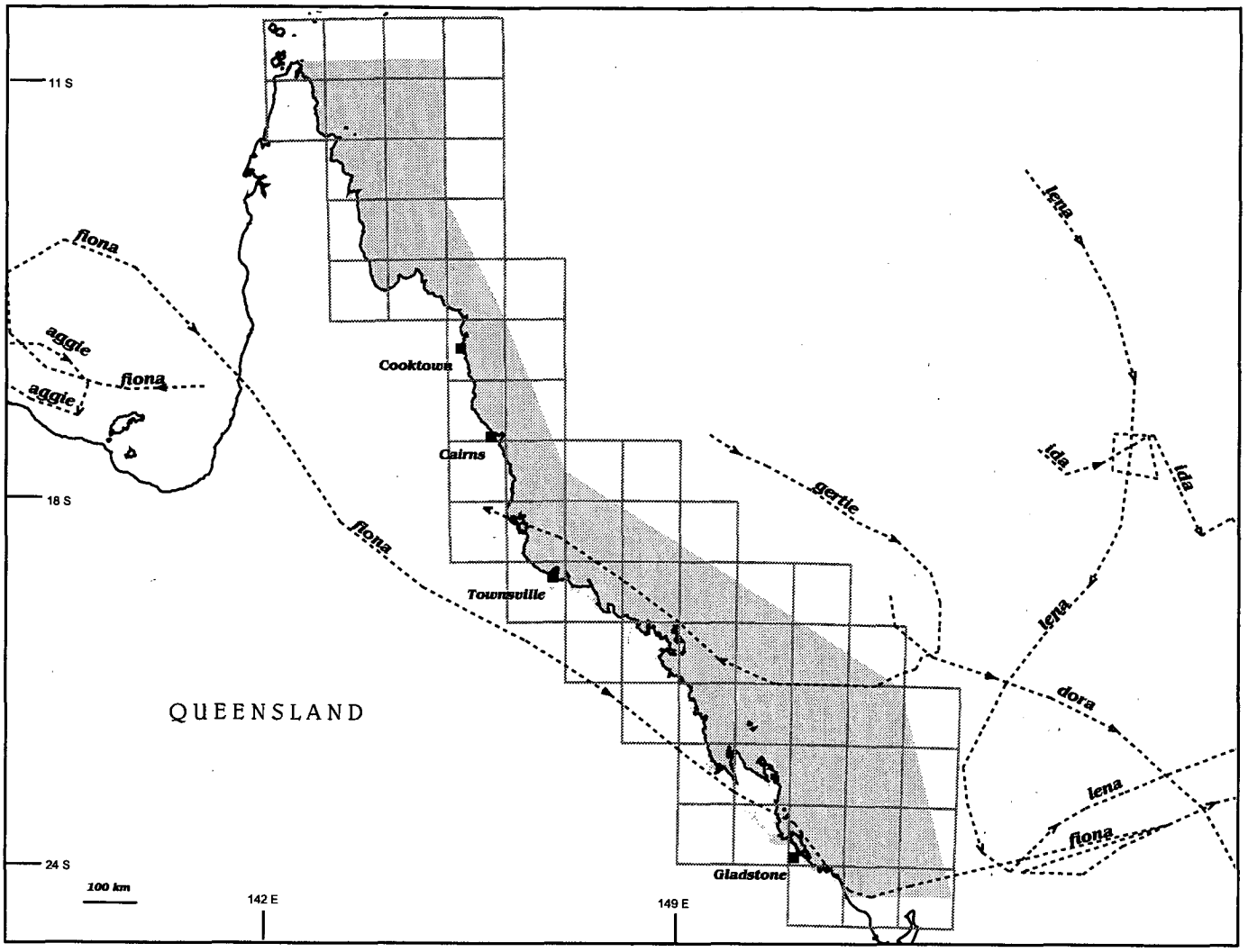
Map 67: *1969: All cyclone paths passing in the vicinity of the GBR Region. Dashed lines represent cyclone paths, with arrows indicating the direction of movement.*



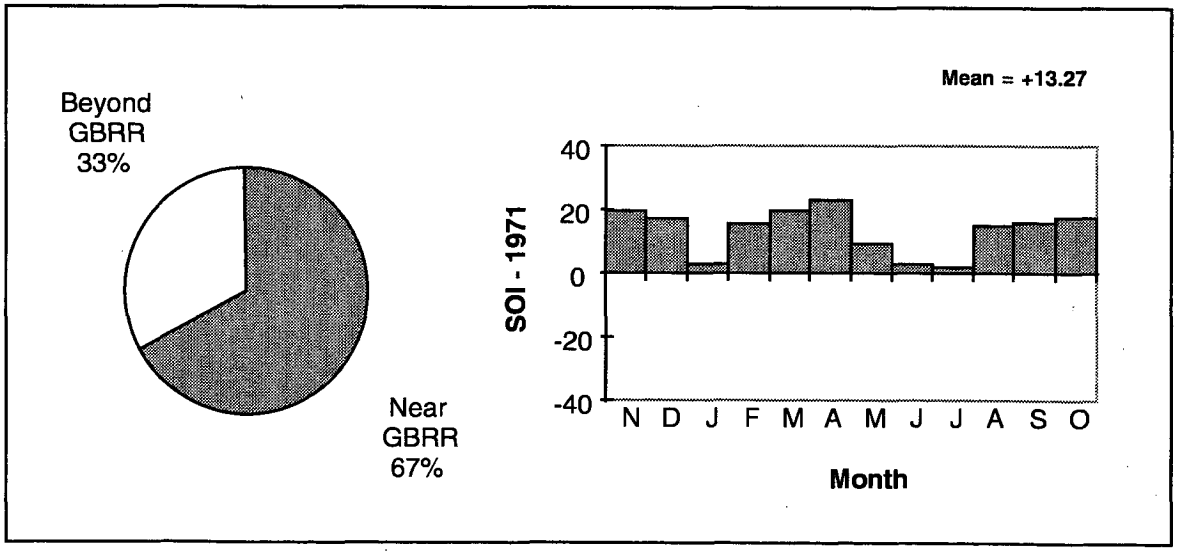
1969-1970



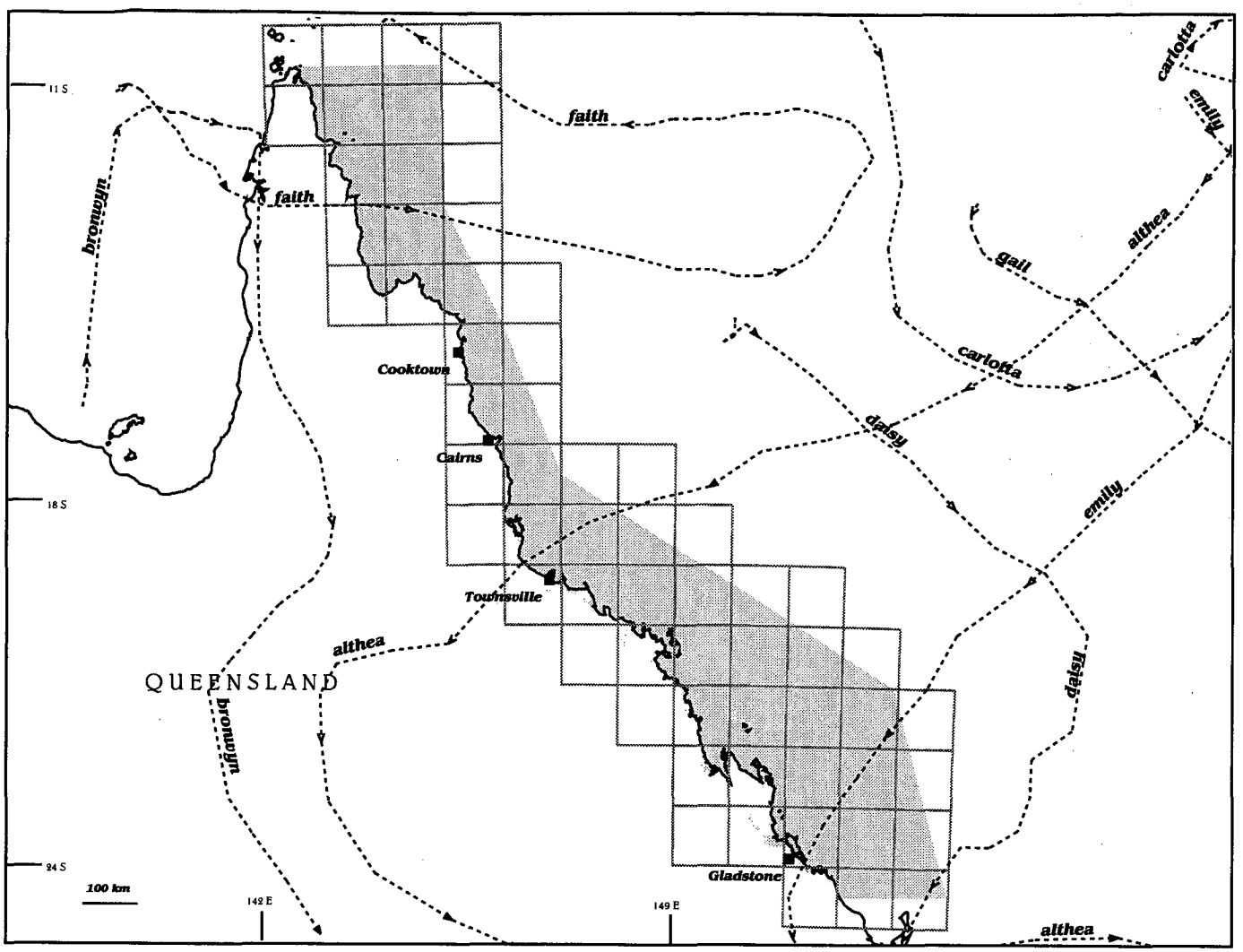
Map 68: *1970: All cyclone paths passing in the vicinity of the GBR Region. Dashed lines represent cyclone paths, with arrows indicating the direction of movement.*



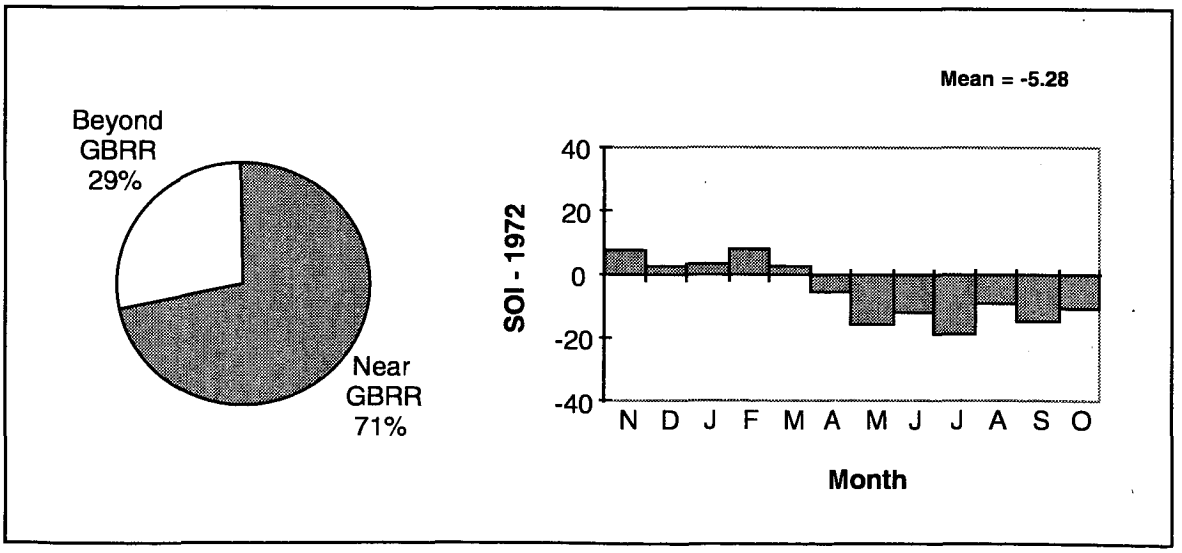
1970-1971



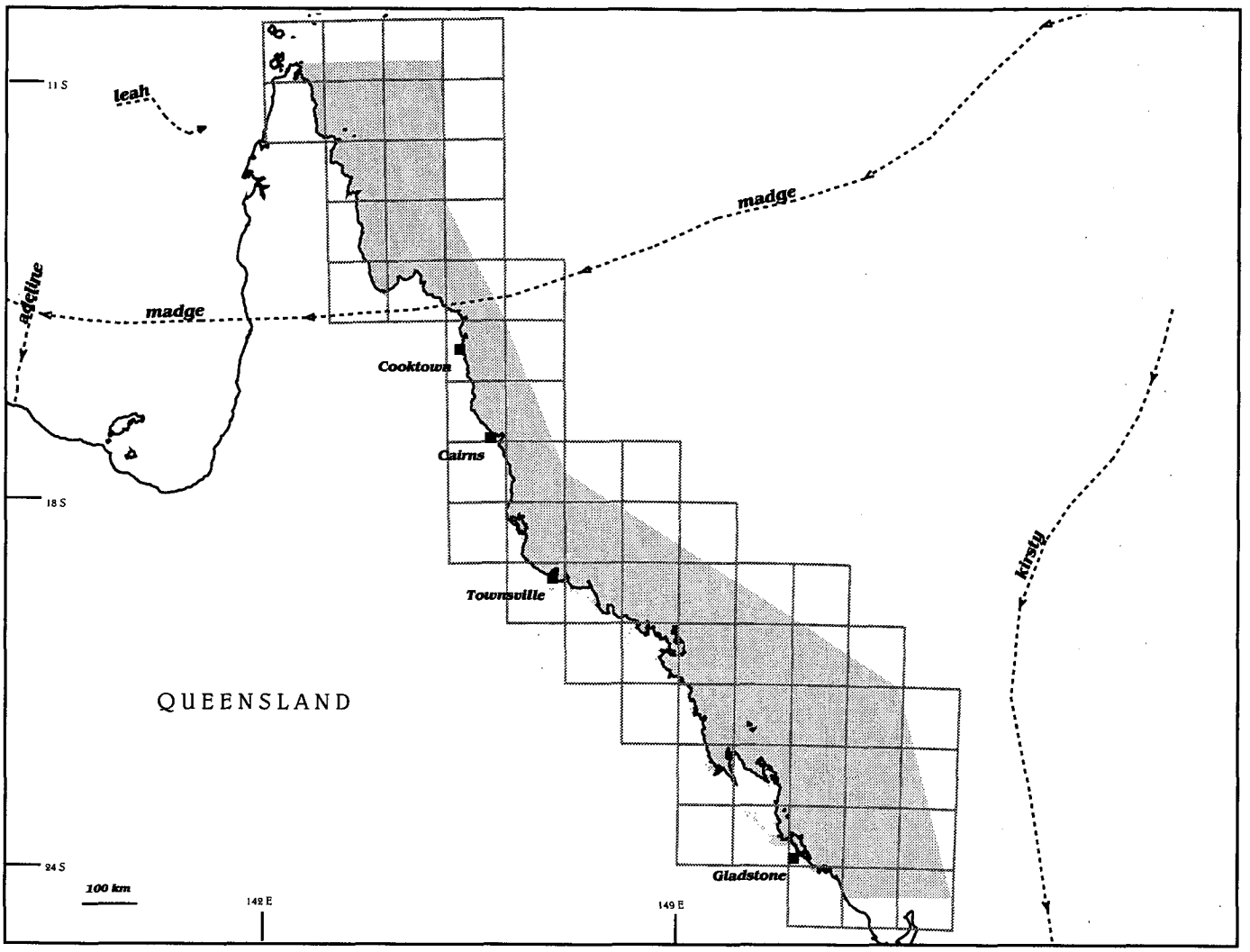
Map 69: *1971: All cyclone paths passing in the vicinity of the GBR Region. Dashed lines represent cyclone paths, with arrows indicating the direction of movement.*



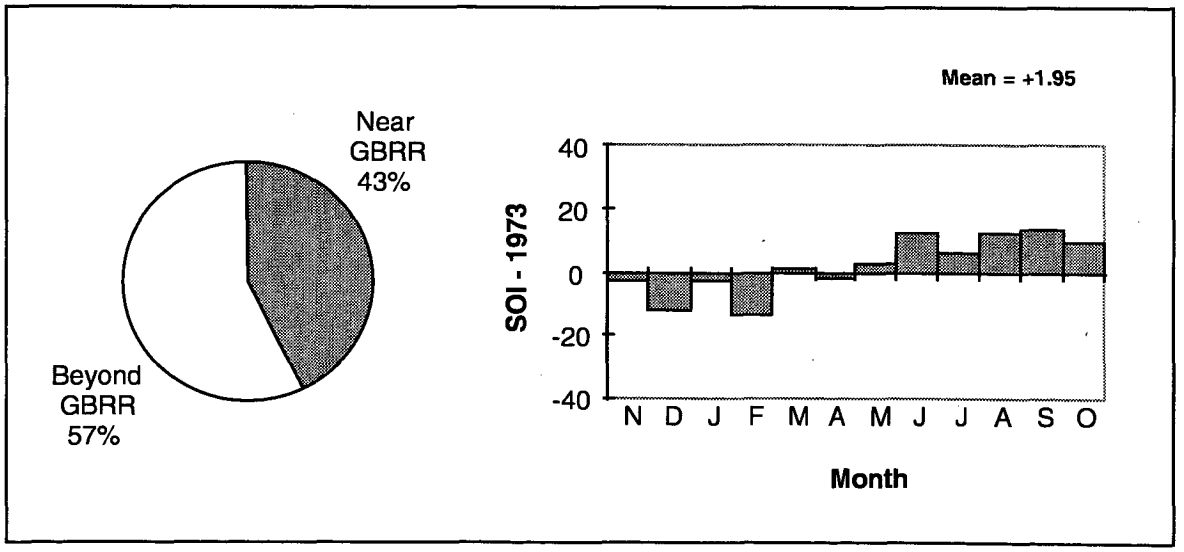
1971-1972



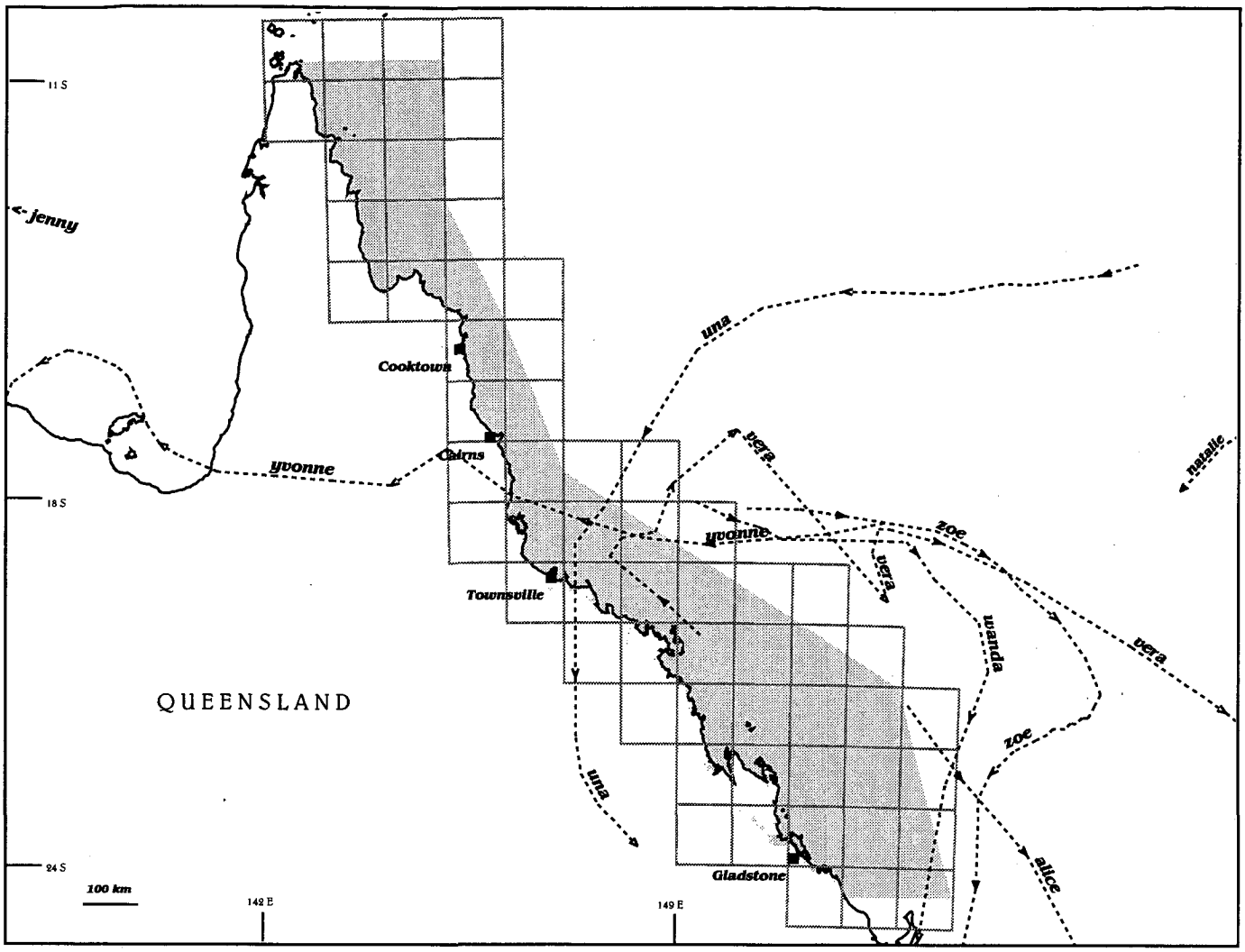
Map 70: *1972: All cyclone paths passing in the vicinity of the GBR Region. Dashed lines represent cyclone paths, with arrows indicating the direction of movement.*



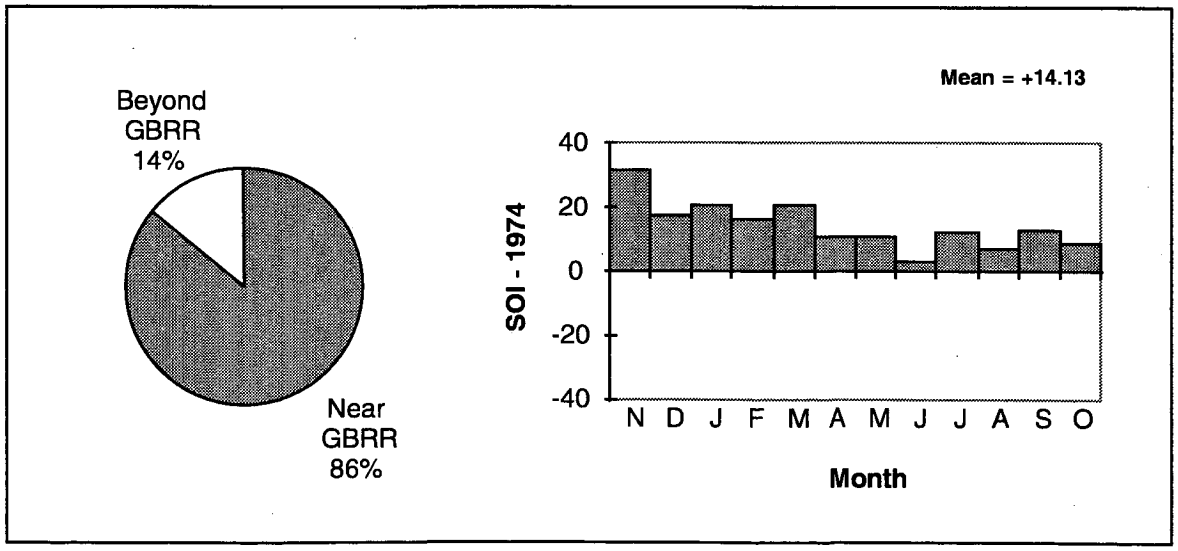
1972-1973



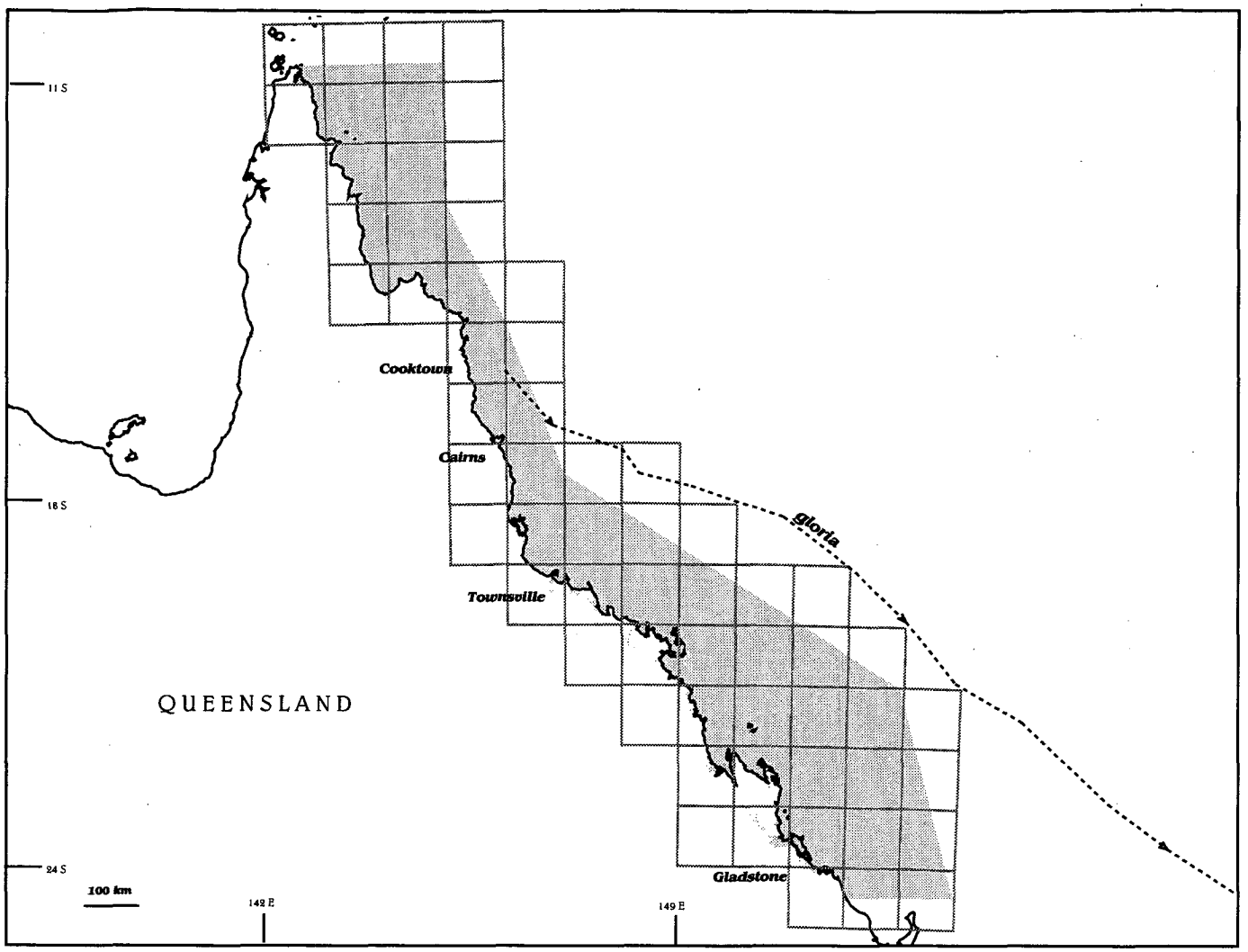
Map 71: *1973: All cyclone paths passing in the vicinity of the GBR Region. Dashed lines represent cyclone paths, with arrows indicating the direction of movement.*



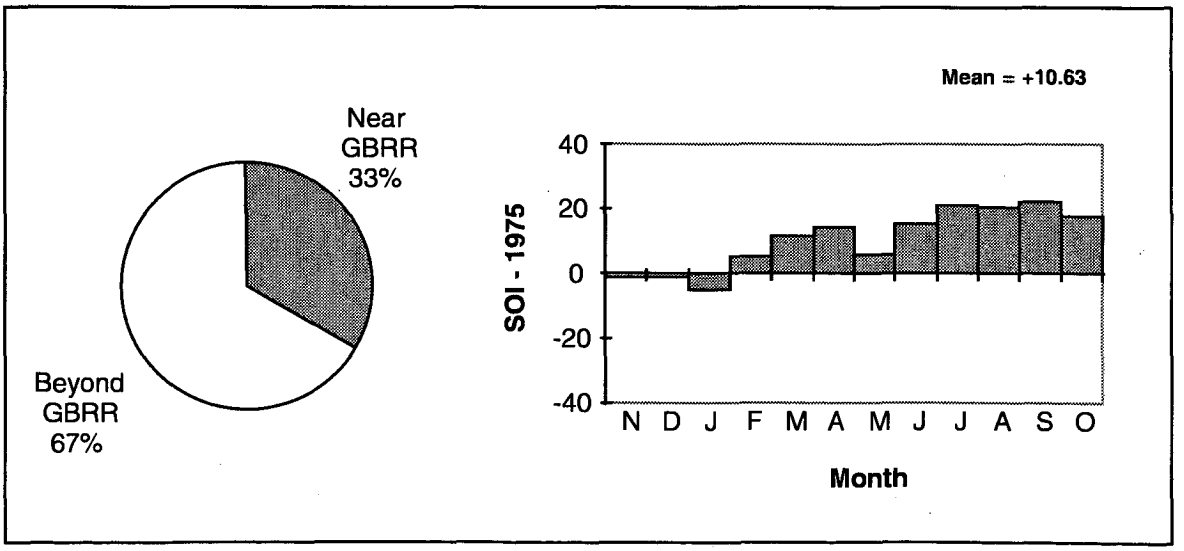
1973-1974



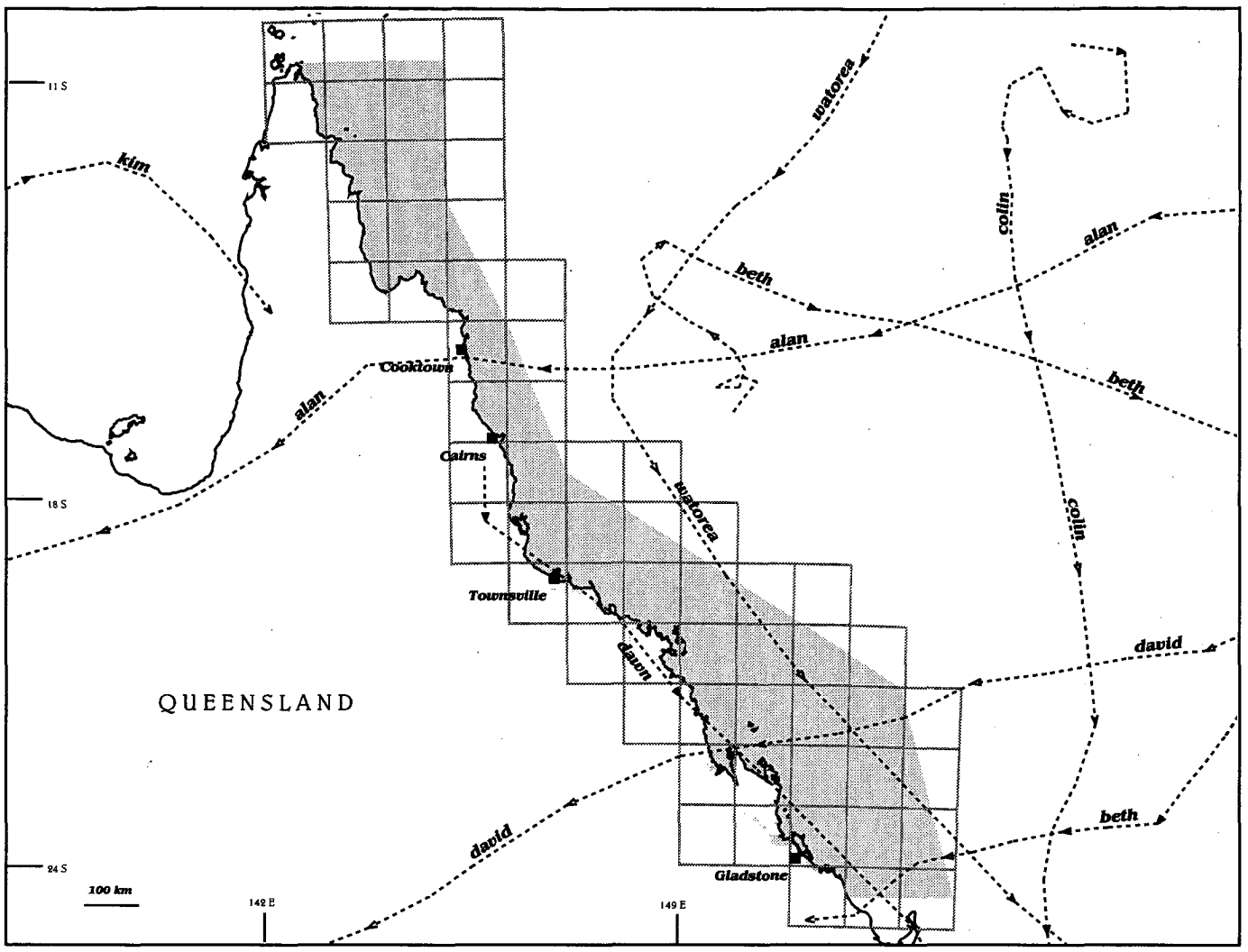
Map 72: *1974: All cyclone paths passing in the vicinity of the GBR Region. Dashed lines represent cyclone paths, with arrows indicating the direction of movement.*



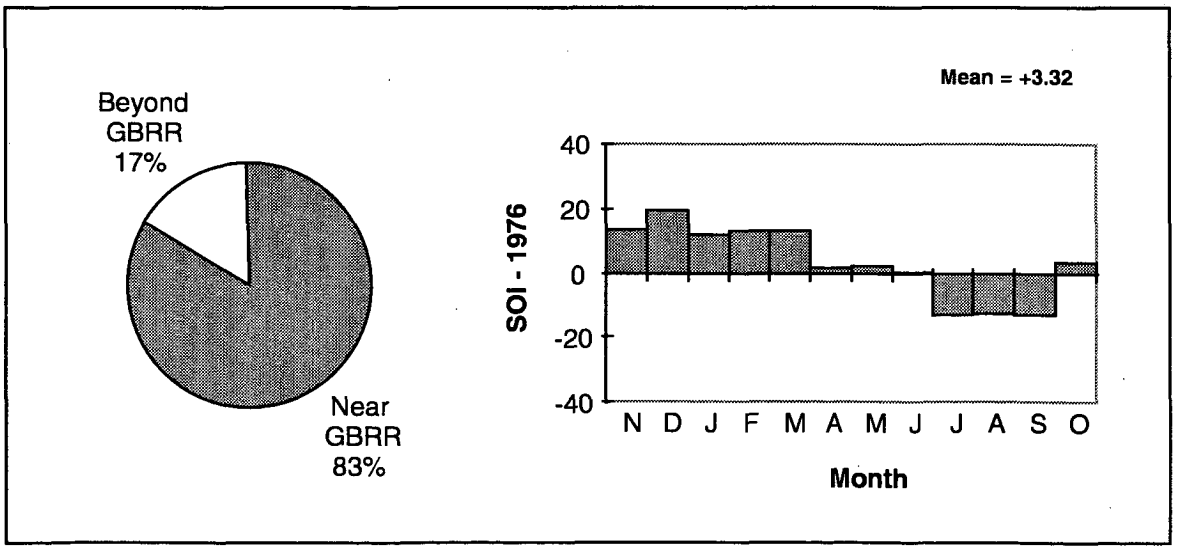
1974-1975



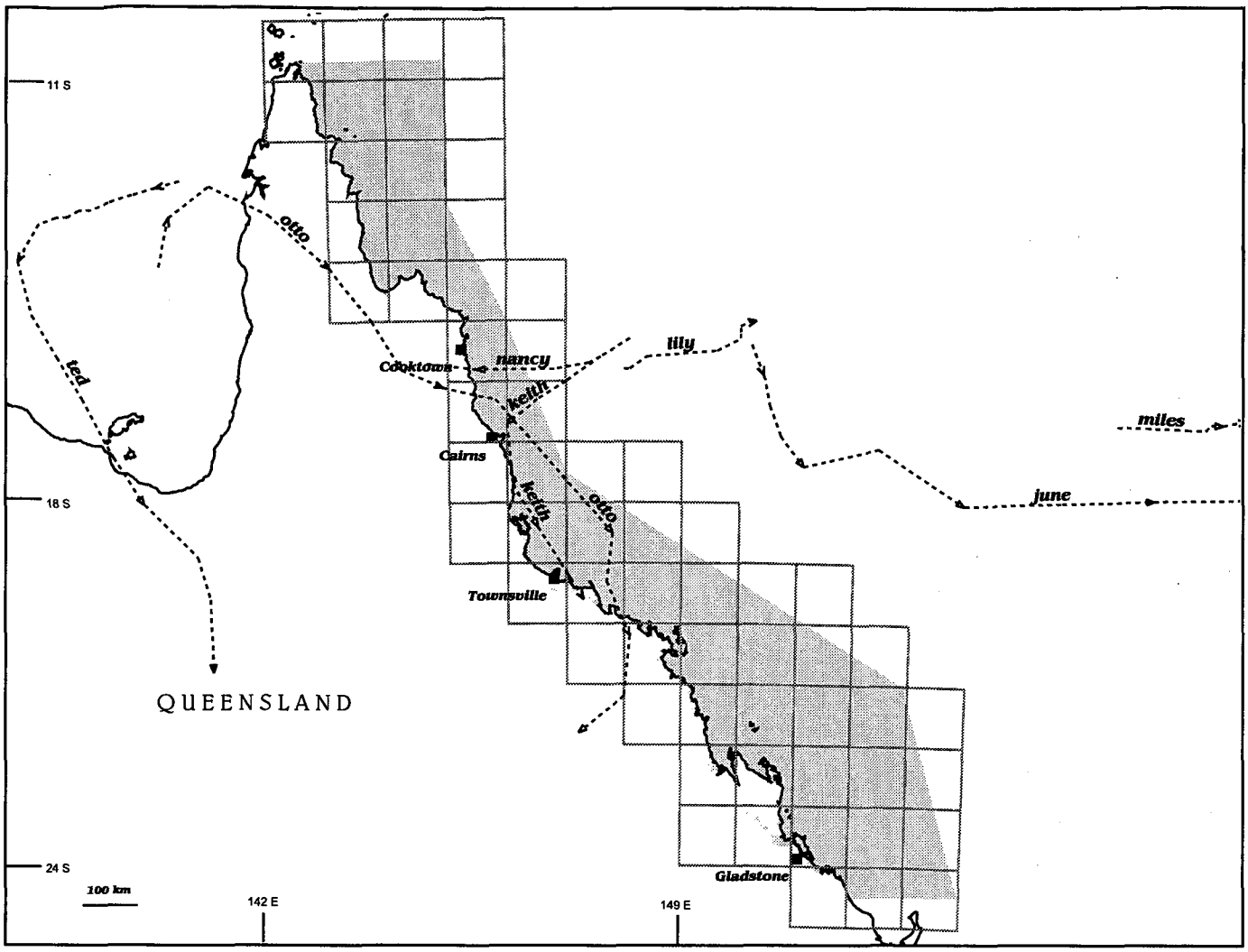
Map 73: *1975: All cyclone paths passing in the vicinity of the GBR Region. Dashed lines represent cyclone paths, with arrows indicating the direction of movement.*



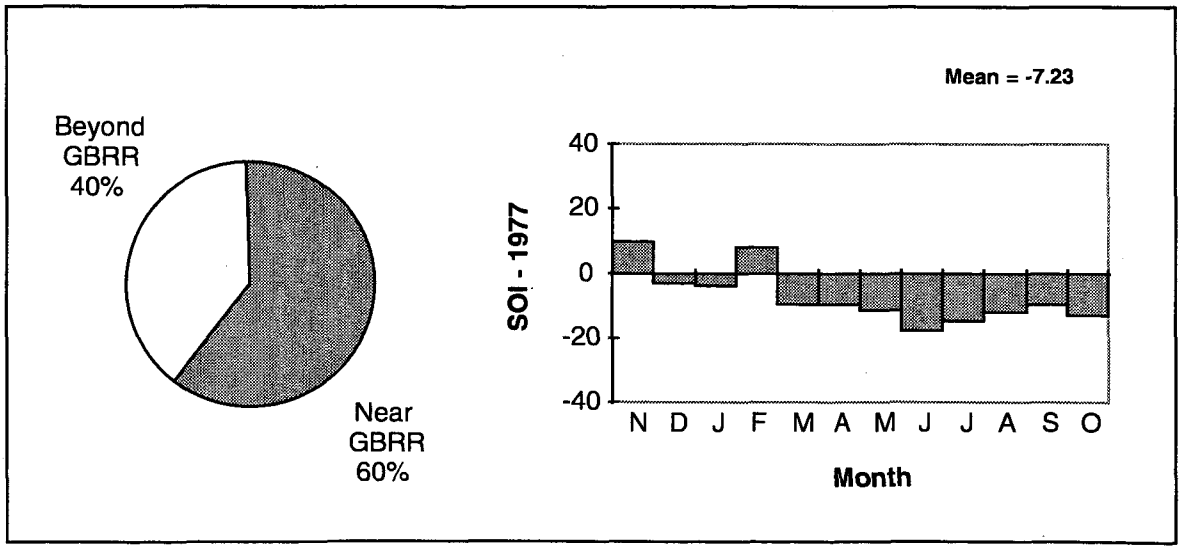
1975-1976



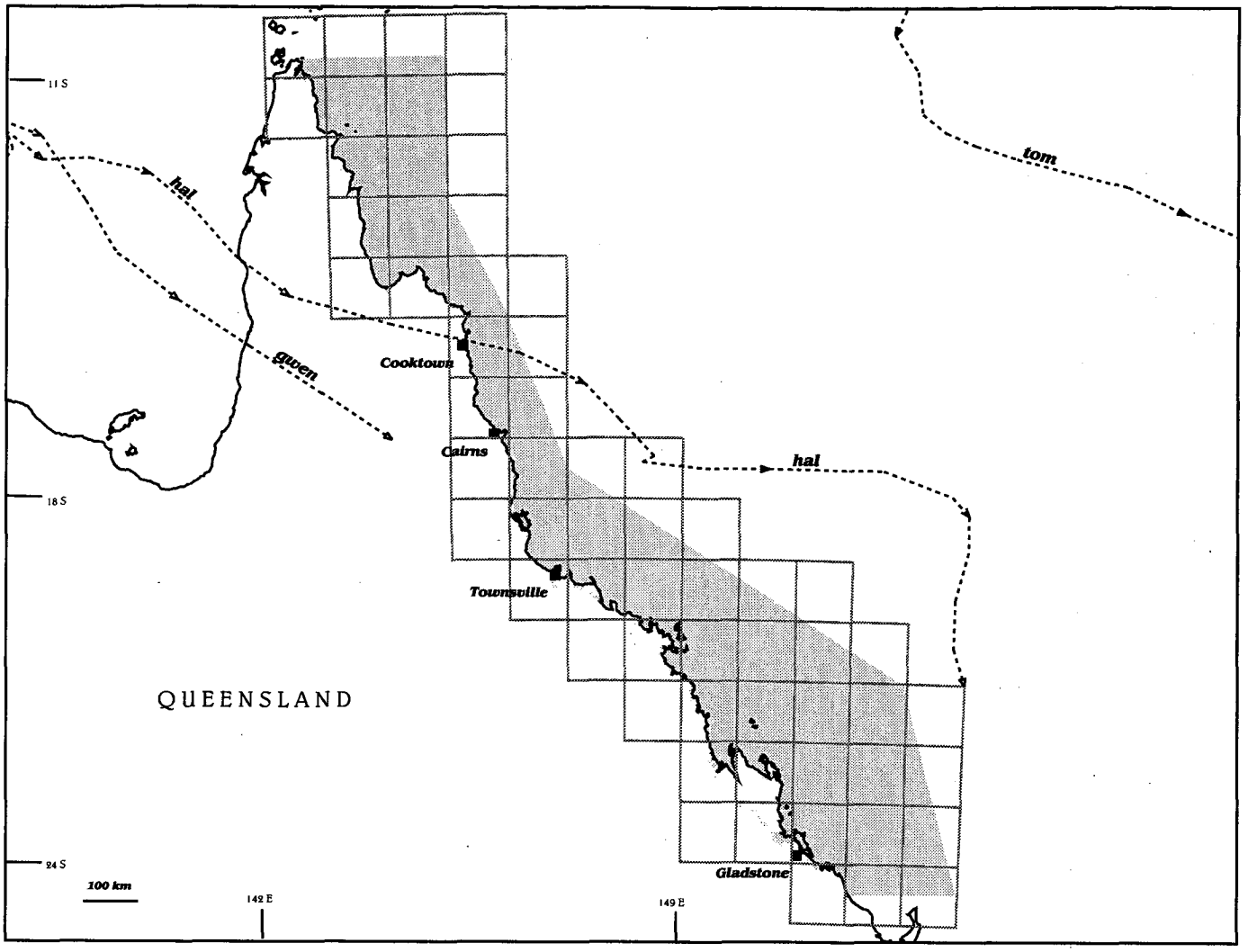
Map 74: *1976: All cyclone paths passing in the vicinity of the GBR Region. Dashed lines represent cyclone paths, with arrows indicating the direction of movement.*



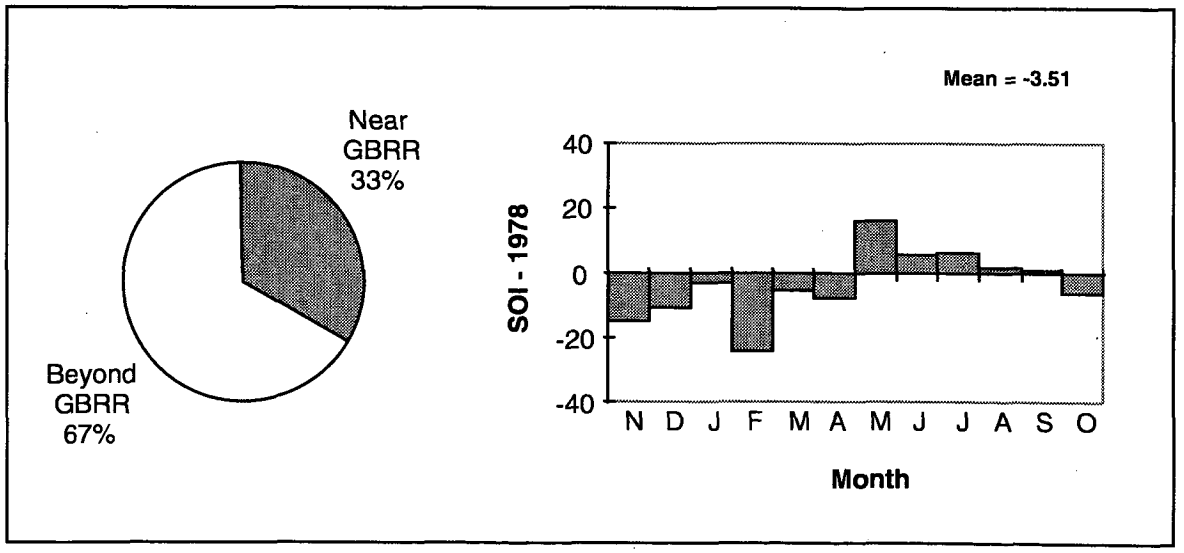
1976-1977



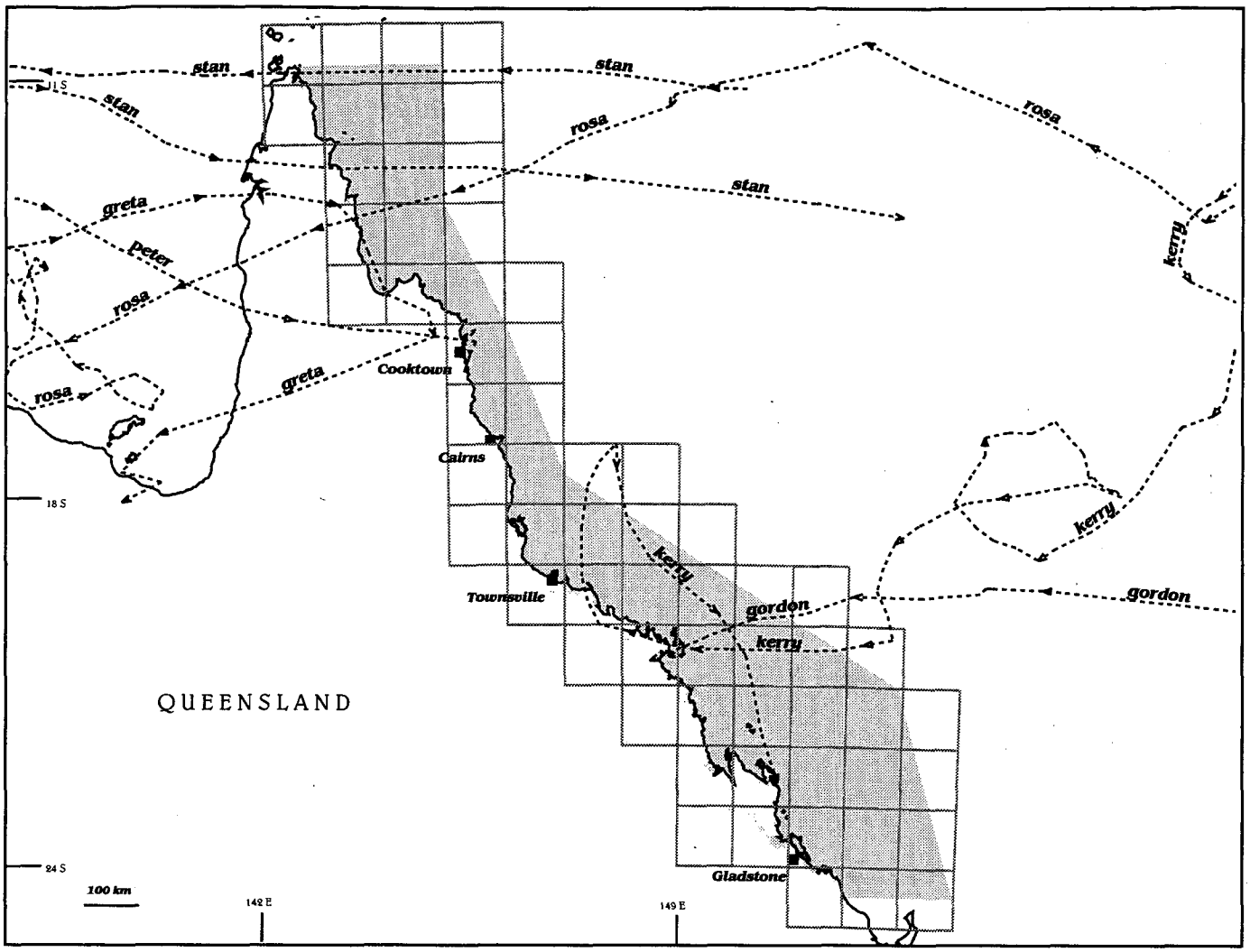
Map 75: *1977: All cyclone paths passing in the vicinity of the GBR Region. Dashed lines represent cyclone paths, with arrows indicating the direction of movement.*



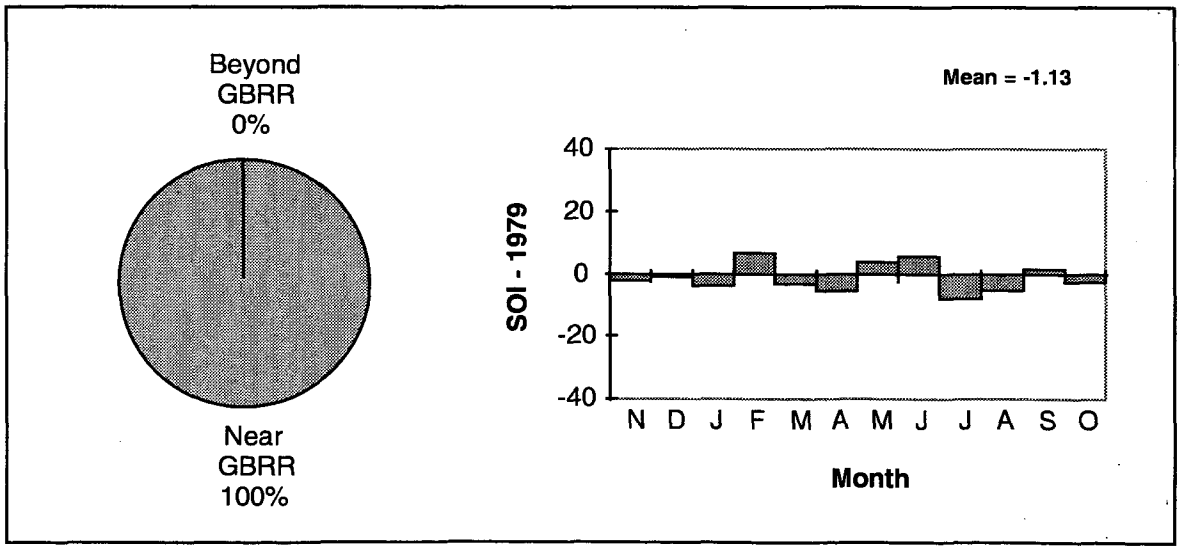
1977-1978



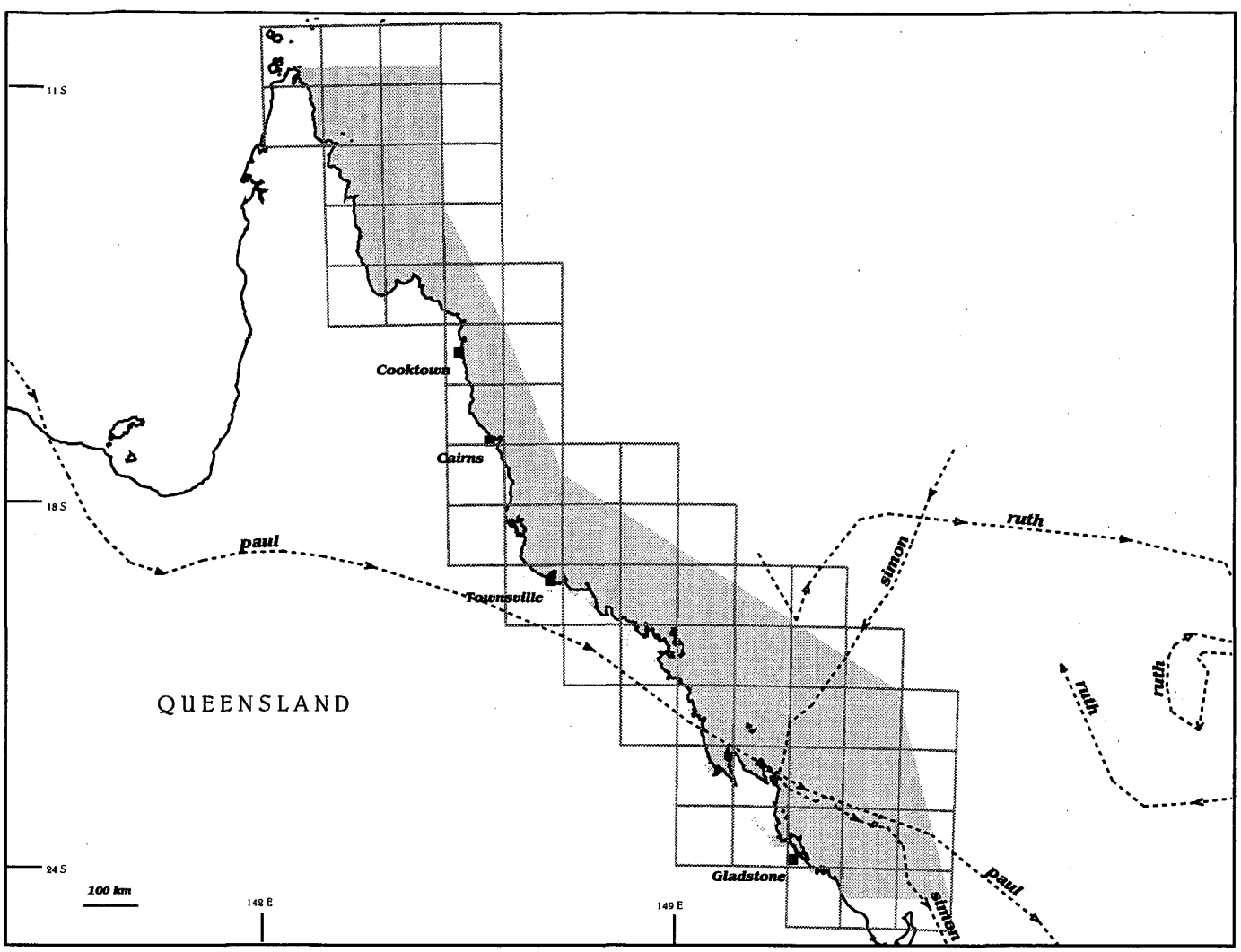
Map 76: *1978: All cyclone paths passing in the vicinity of the GBR Region. Dashed lines represent cyclone paths, with arrows indicating the direction of movement.*



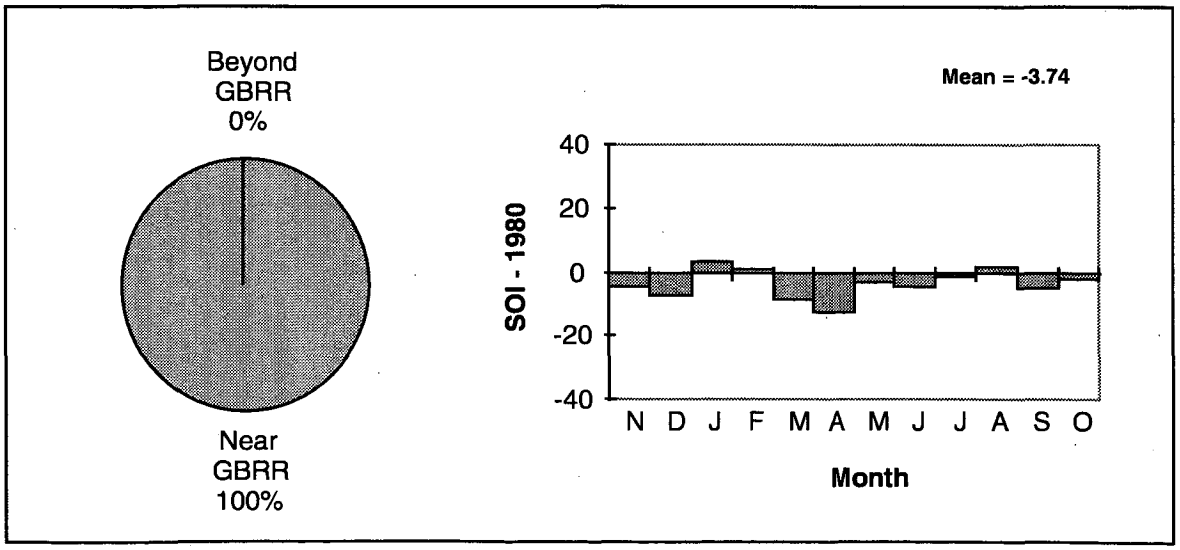
1978-1979



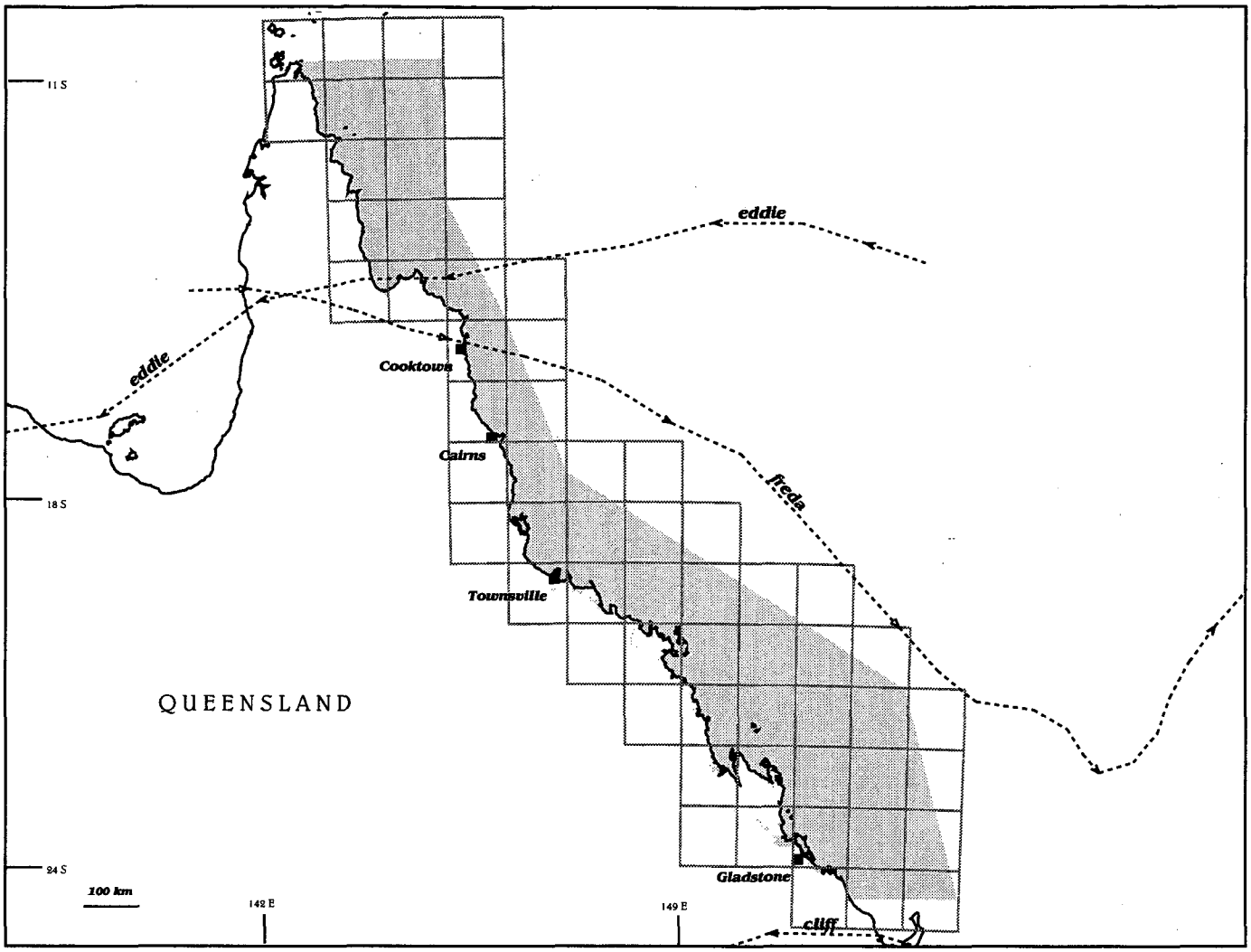
Map 77: *1979: All cyclone paths passing in the vicinity of the GBR Region. Dashed lines represent cyclone paths, with arrows indicating the direction of movement.*



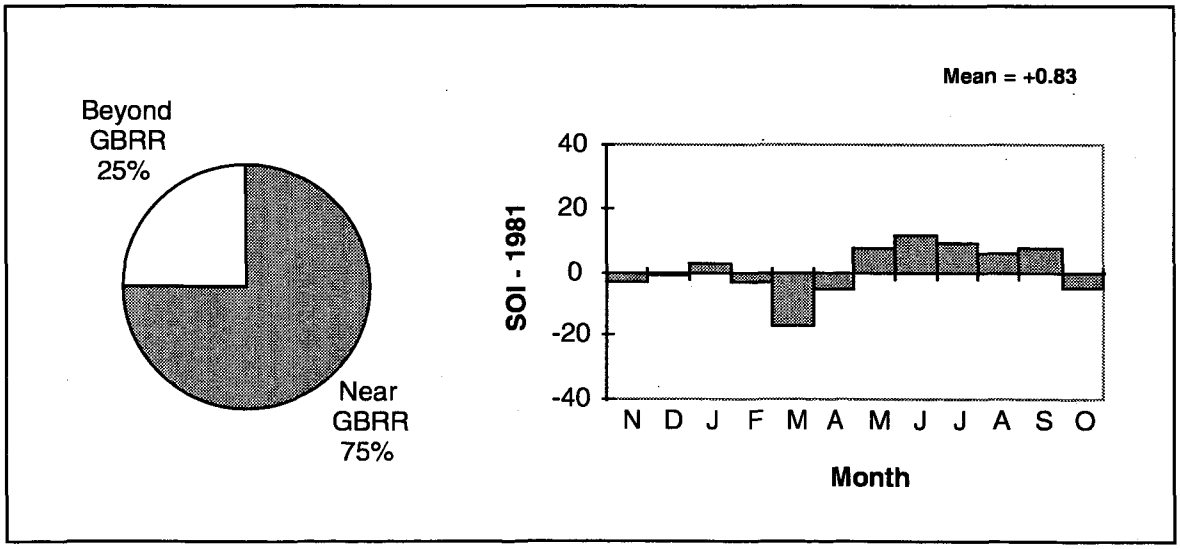
1979-1980



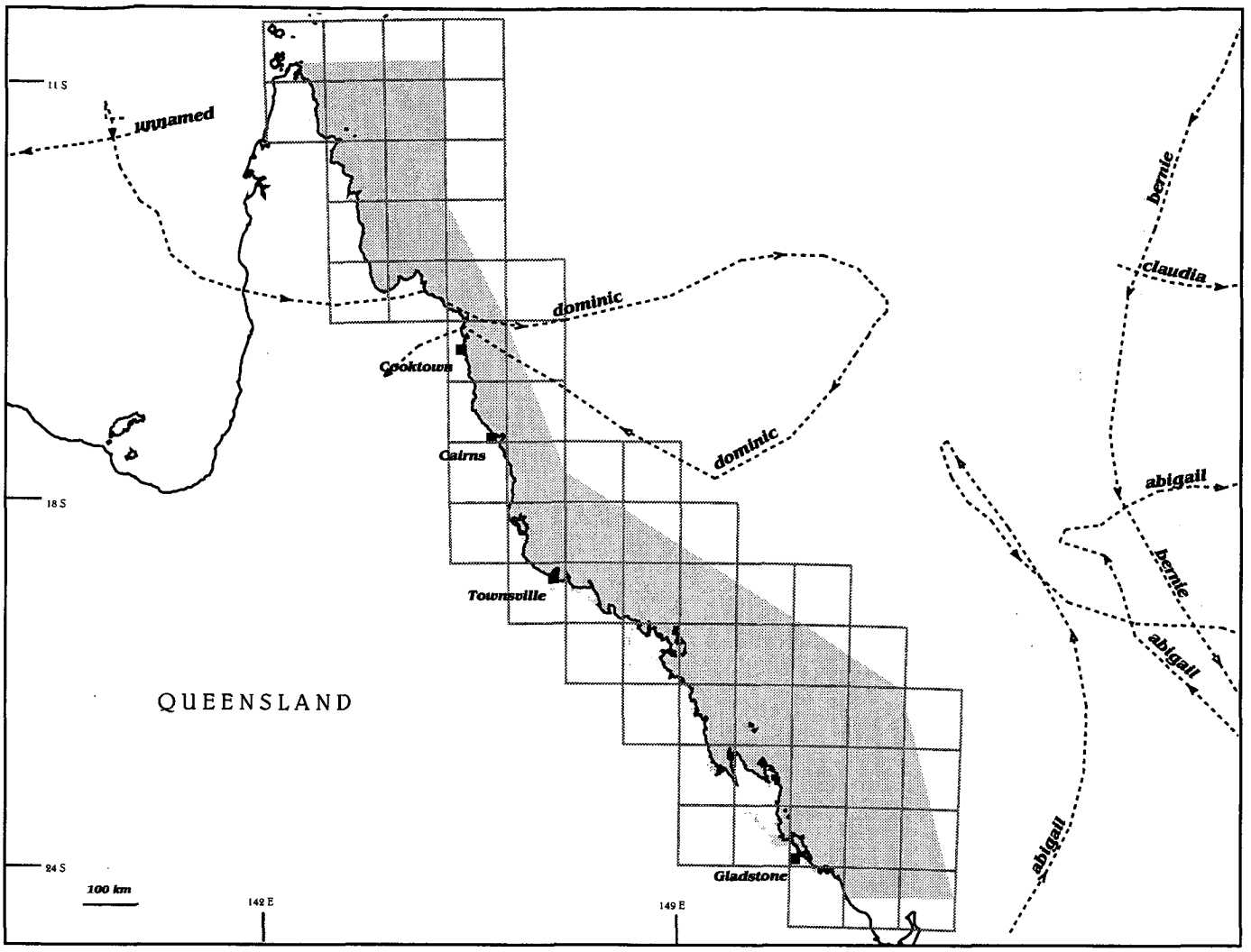
Map 78: *1980: All cyclone paths passing in the vicinity of the GBR Region. Dashed lines represent cyclone paths, with arrows indicating the direction of movement.*



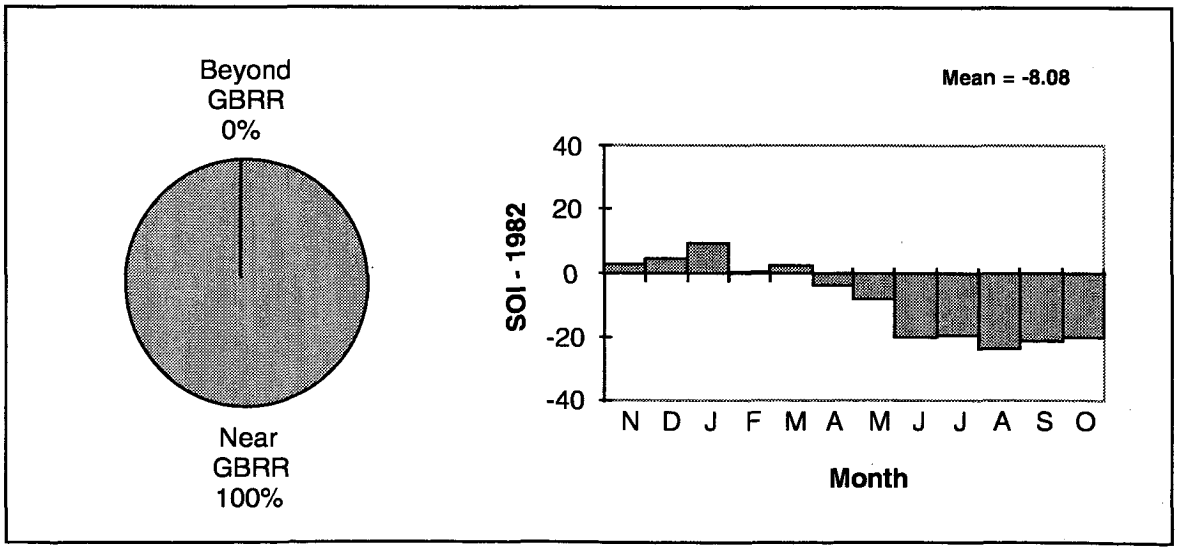
1980-1981



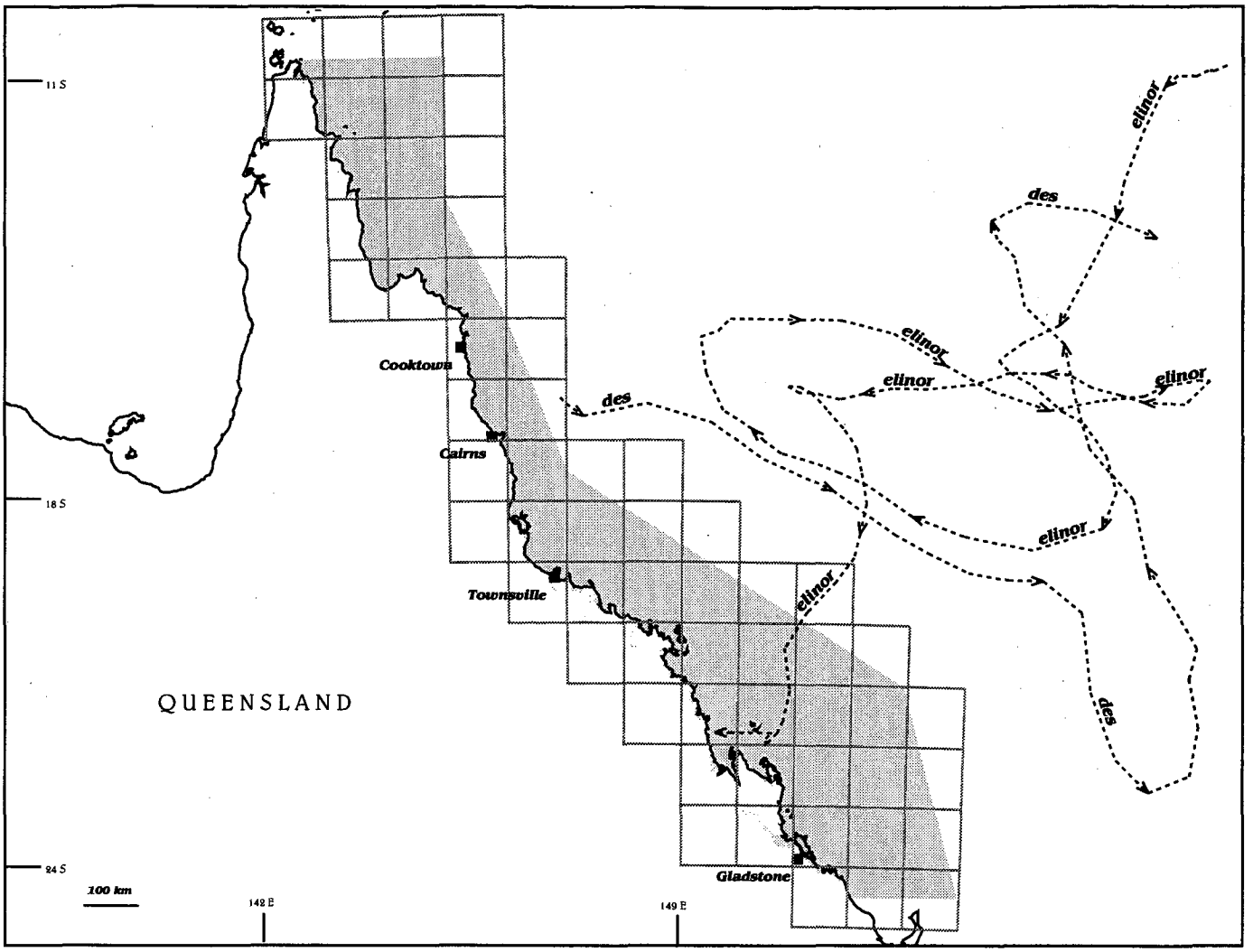
Map 79: *1981: All cyclone paths passing in the vicinity of the GBR Region. Dashed lines represent cyclone paths, with arrows indicating the direction of movement.*



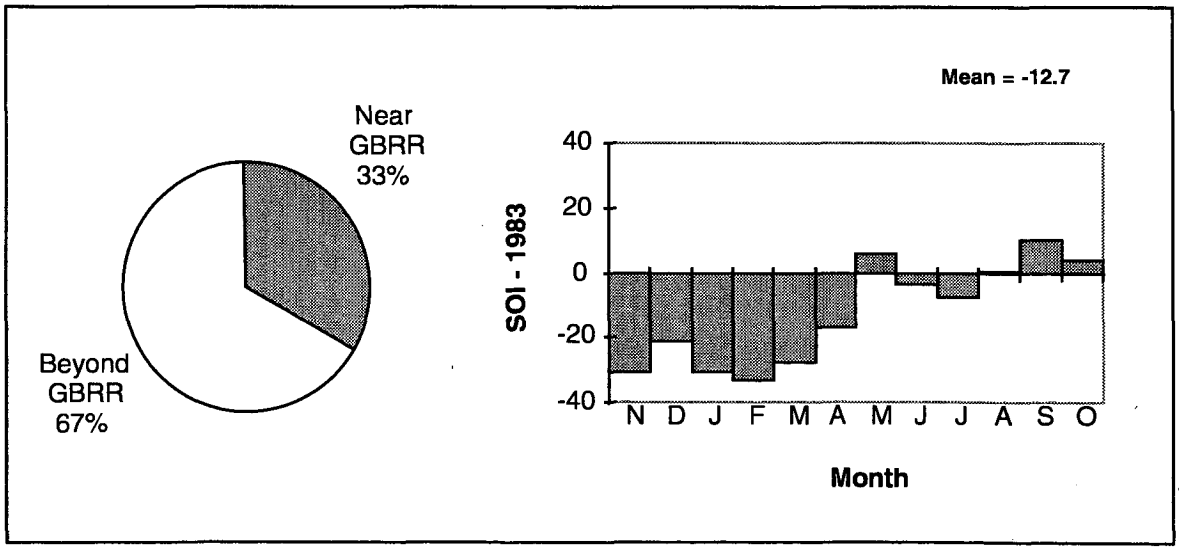
1981-1982



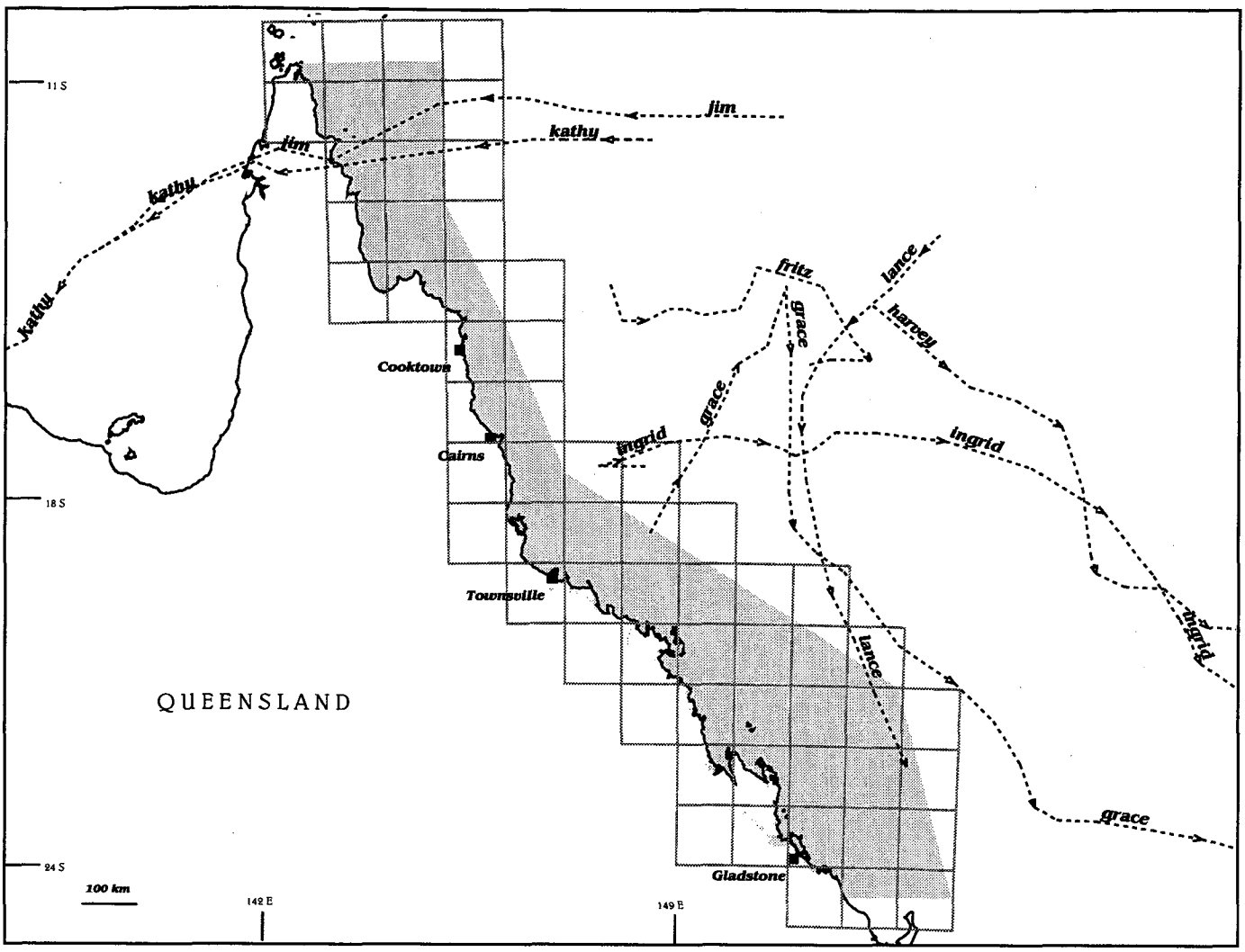
Map 80: *1982: All cyclone paths passing in the vicinity of the GBR Region. Dashed lines represent cyclone paths, with arrows indicating the direction of movement.*



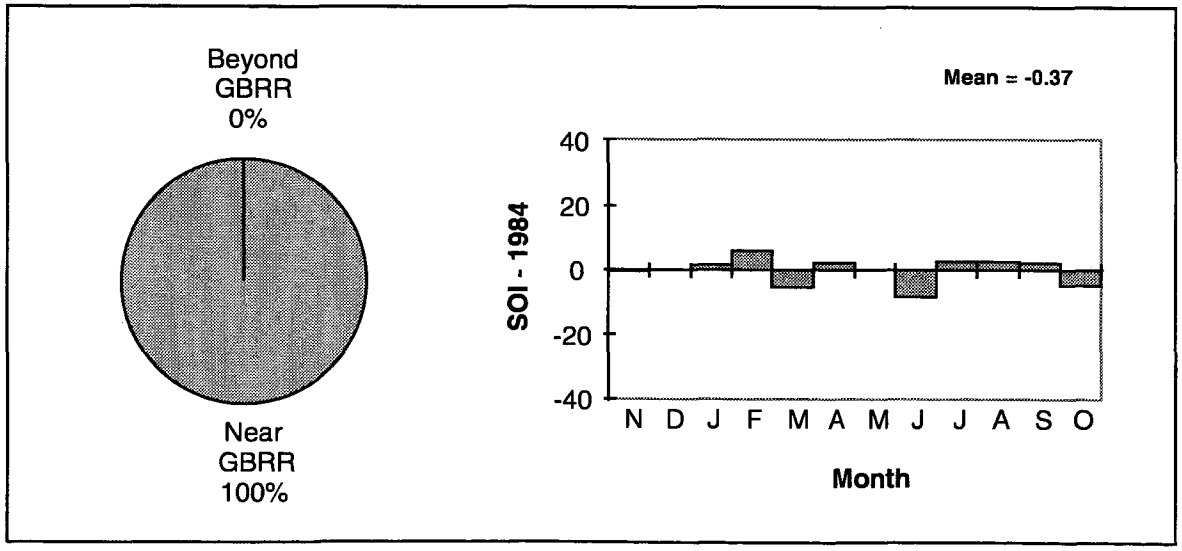
1982-1983



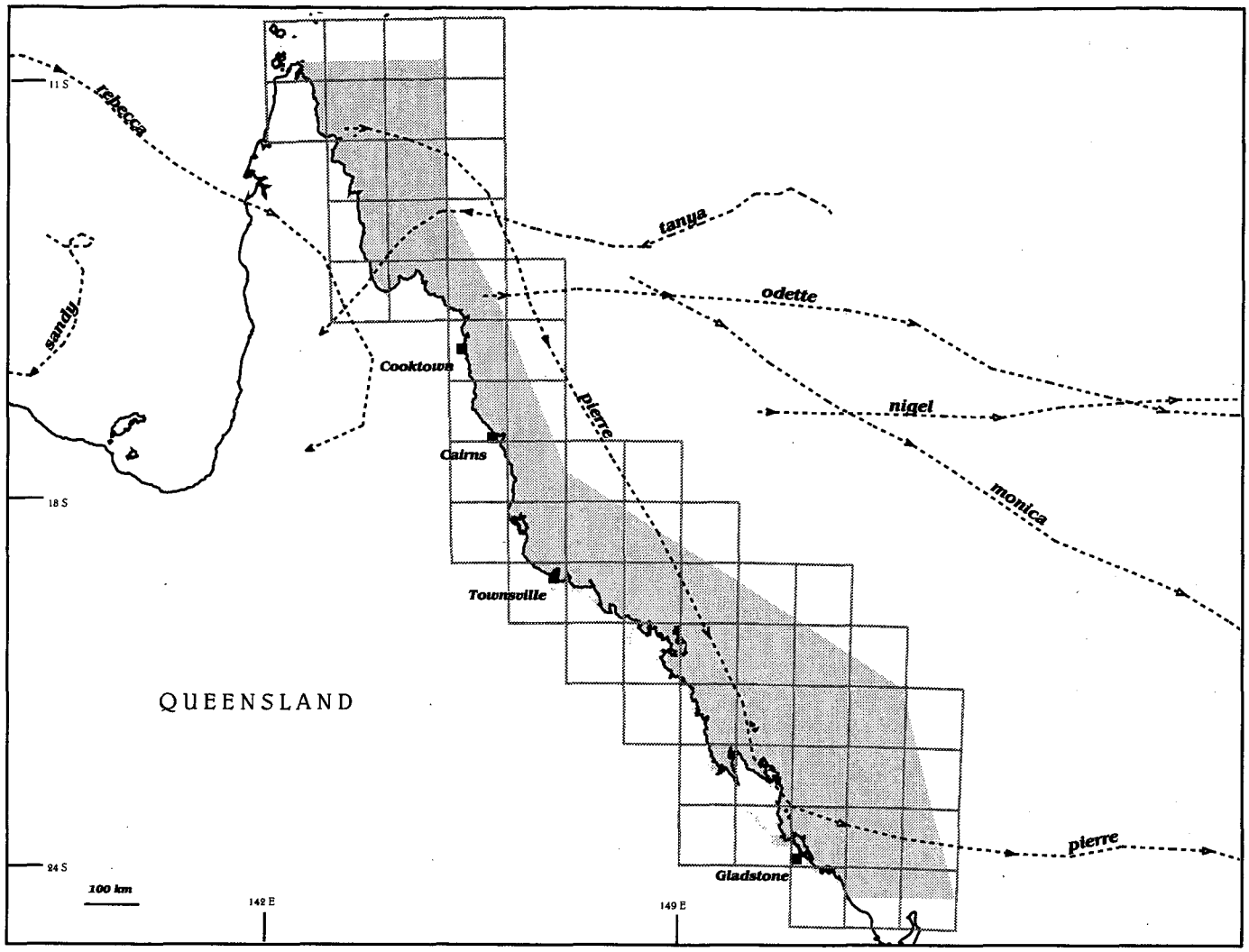
Map 81: *1983: All cyclone paths passing in the vicinity of the GBR Region. Dashed lines represent cyclone paths, with arrows indicating the direction of movement.*



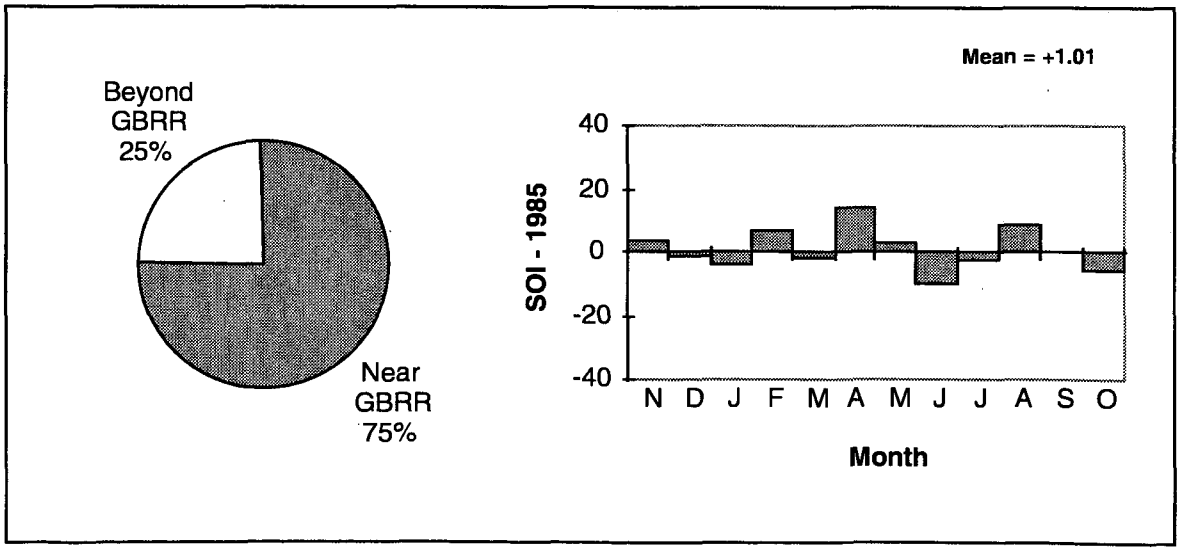
1983-1984



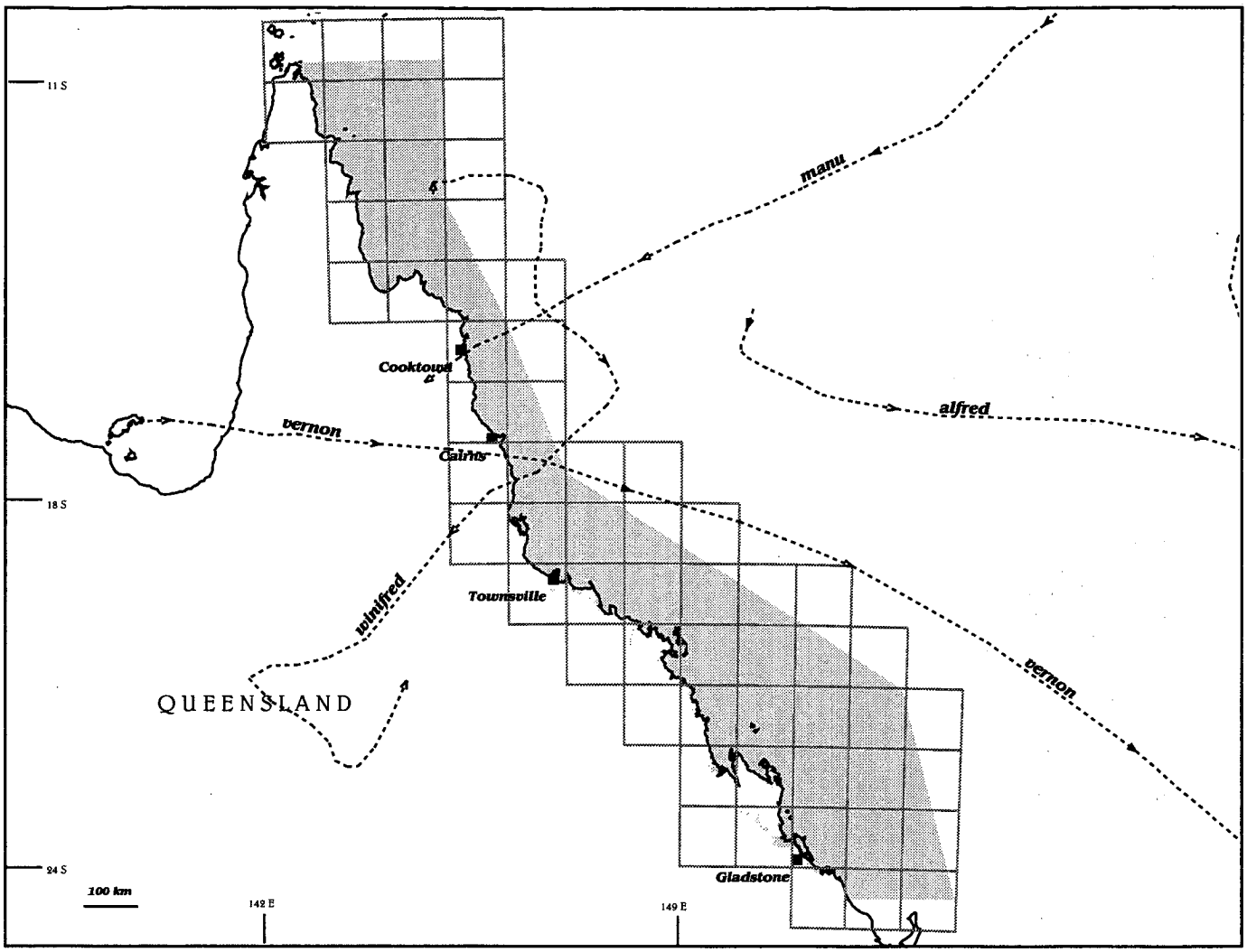
Map 82 : *1984: All cyclone paths passing in the vicinity of the GBR Region. Dashed lines represent cyclone paths, with arrows indicating the direction of movement.*



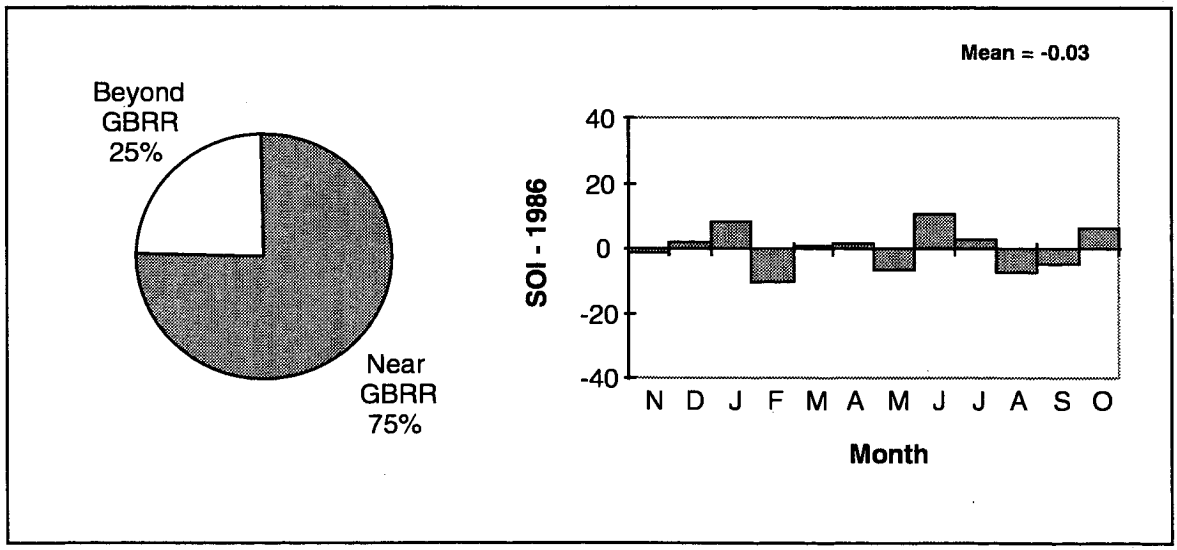
1984-1985



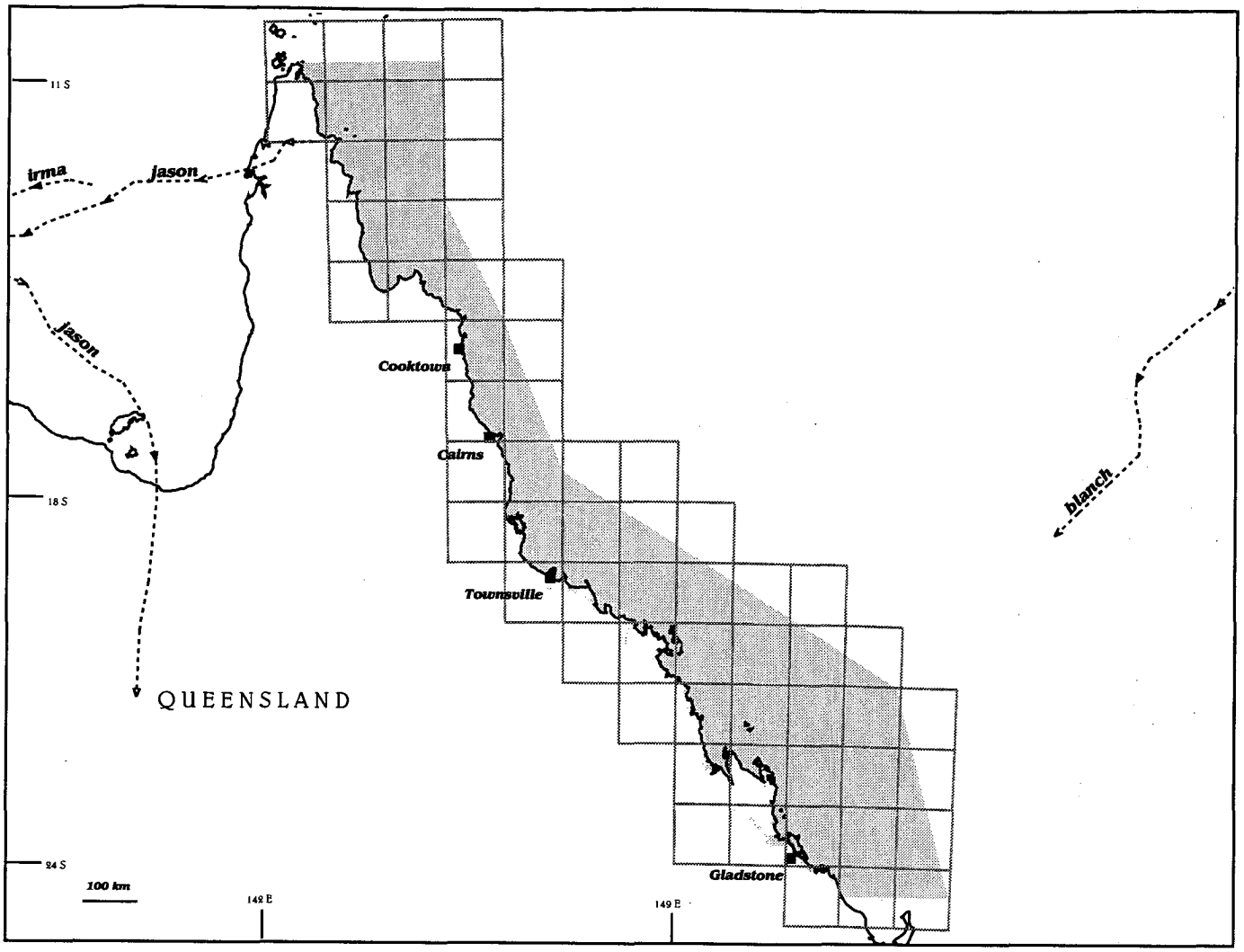
Map 83: *1985: All cyclone paths passing in the vicinity of the GBR Region. Dashed lines represent cyclone paths, with arrows indicating the direction of movement.*



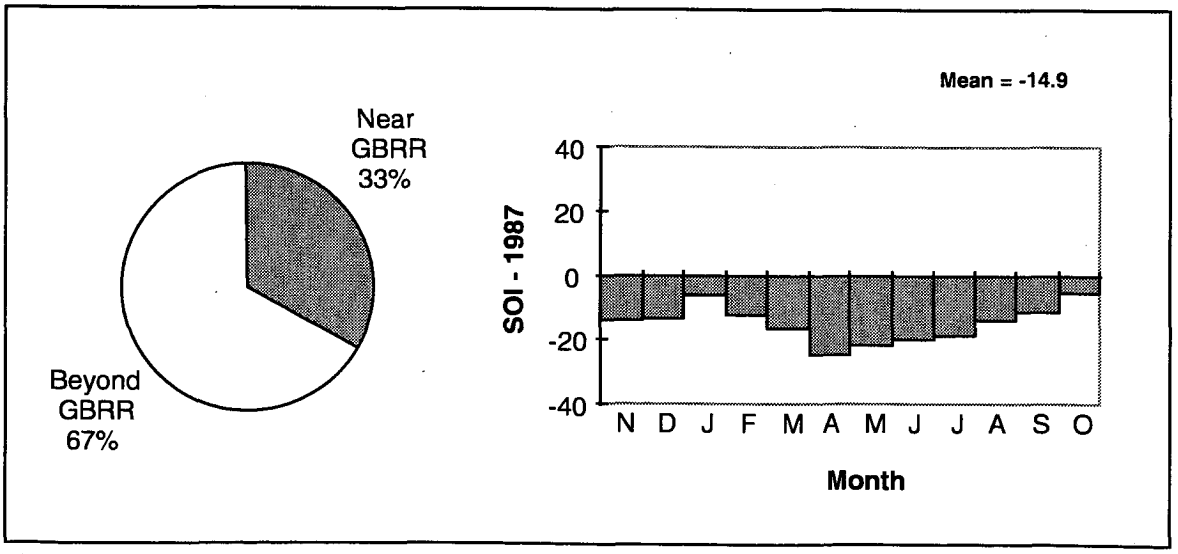
1985-1986



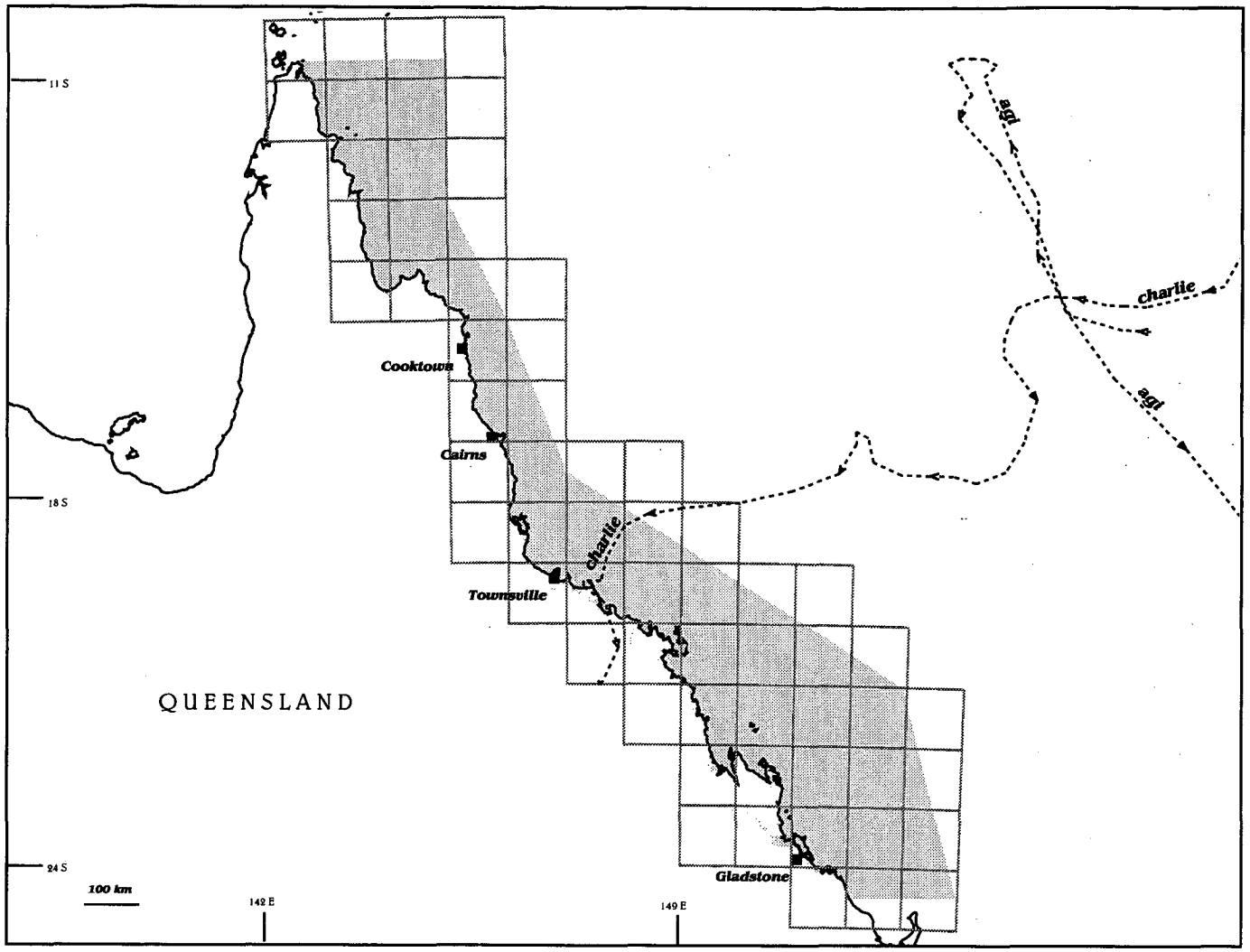
Map 84: *1986: All cyclone paths passing in the vicinity of the GBR Region. Dashed lines represent cyclone paths, with arrows indicating the direction of movement.*



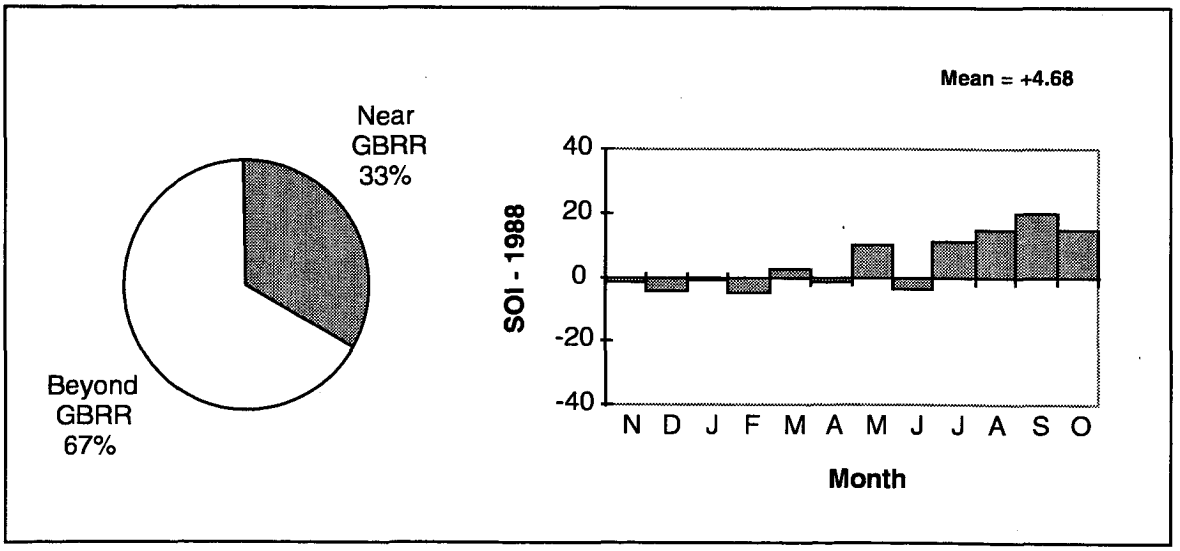
1986-1987



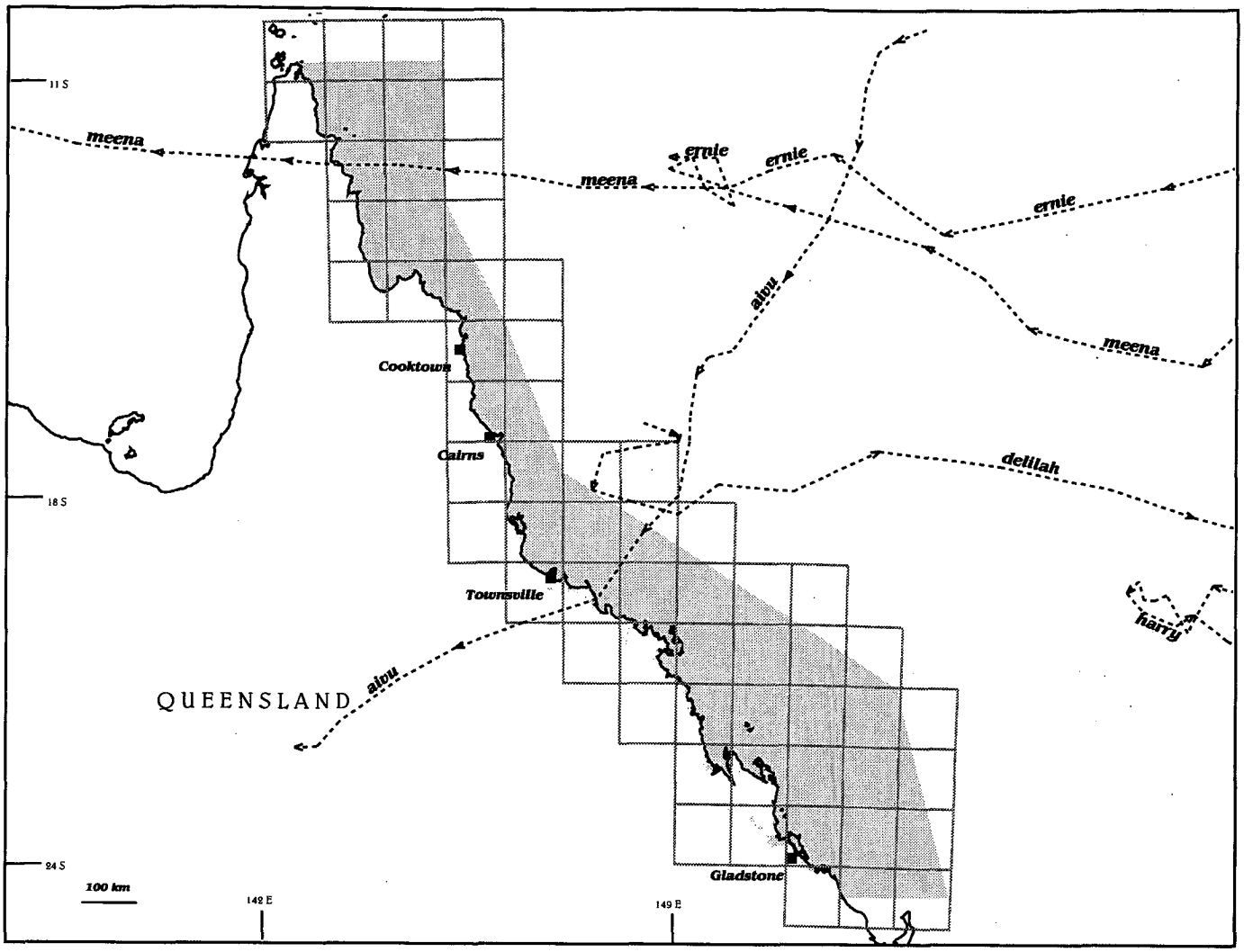
Map 85: *1987: All cyclone paths passing in the vicinity of the GBR Region. Dashed lines represent cyclone paths, with arrows indicating the direction of movement.*



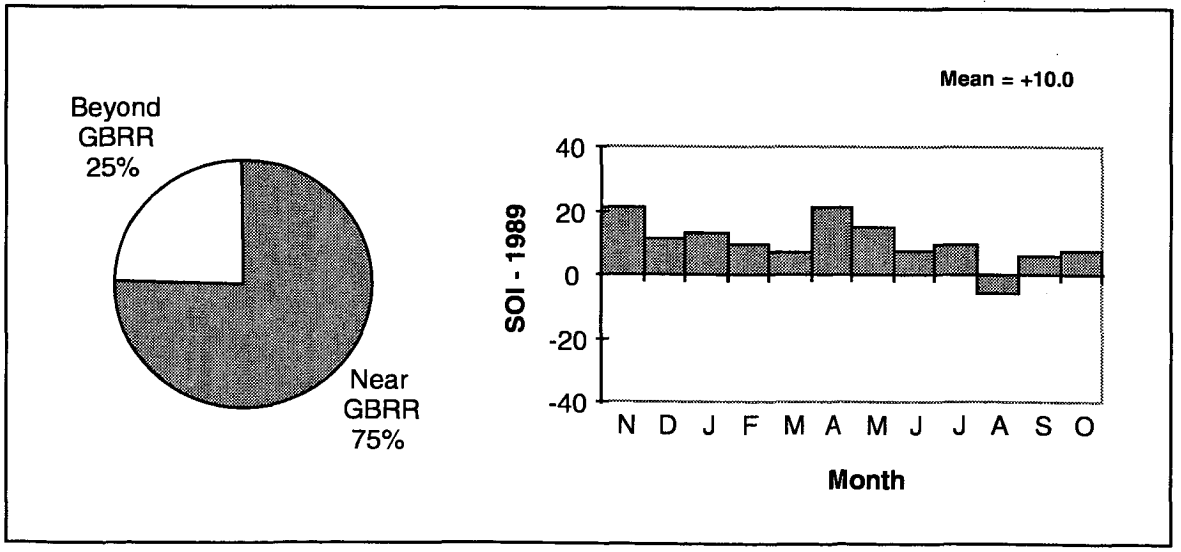
1987-1988



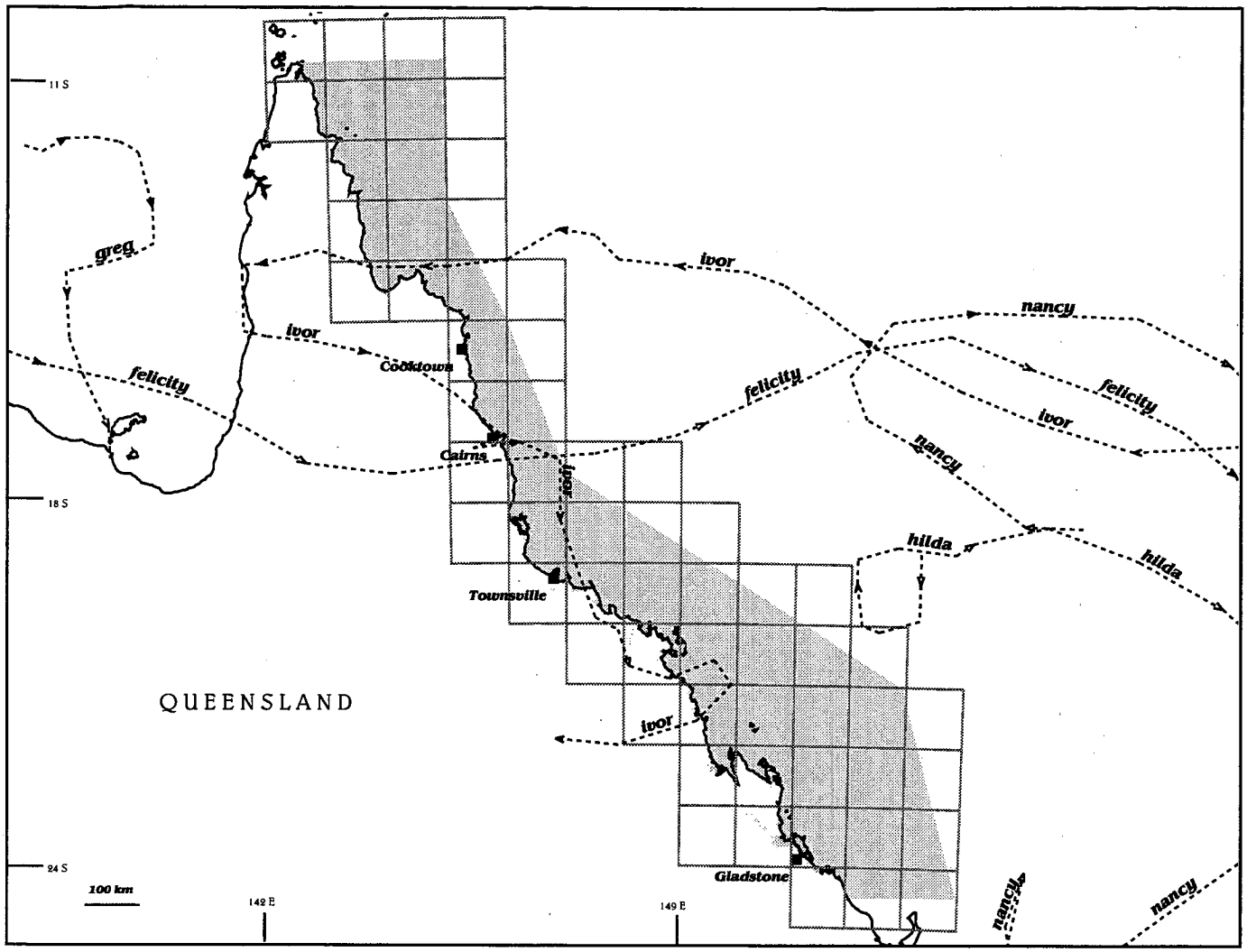
Map 86: *1988: All cyclone paths passing in the vicinity of the GBR Region. Dashed lines represent cyclone paths, with arrows indicating the direction of movement.*



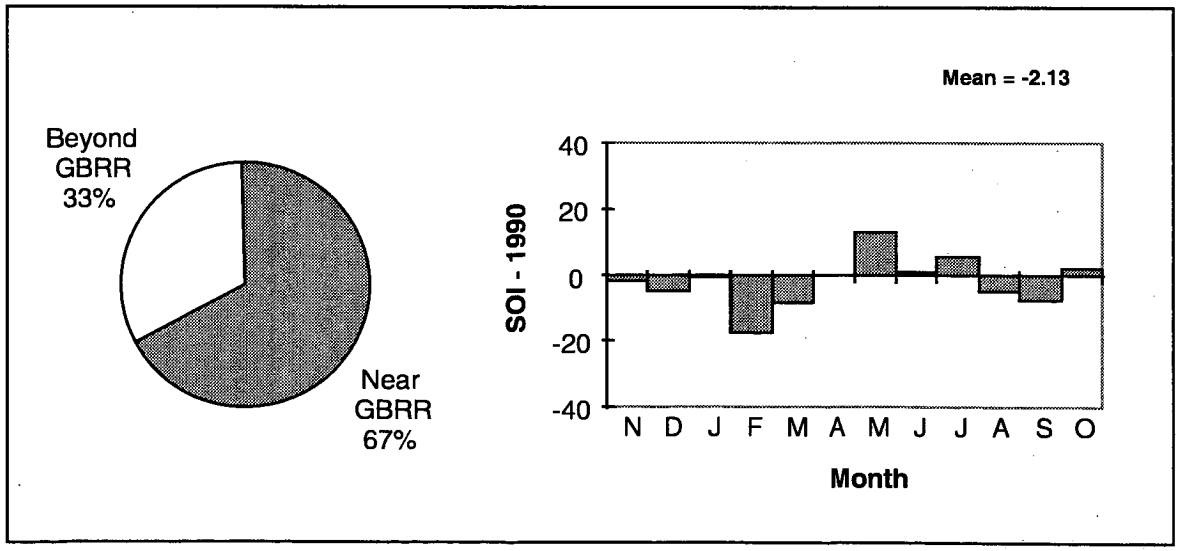
1988-1989



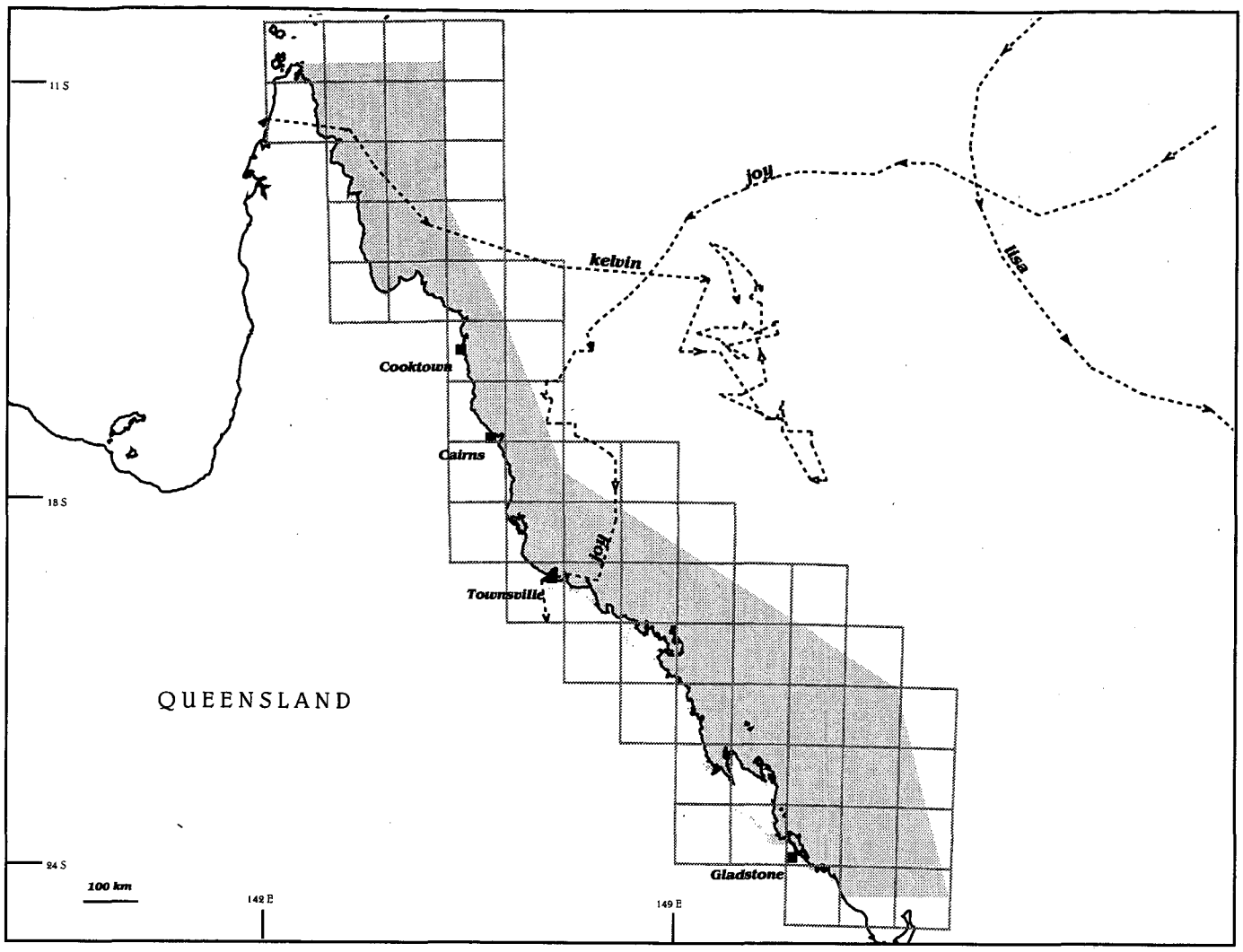
Map 87: *1989: All cyclone paths passing in the vicinity of the GBR Region. Dashed lines represent cyclone paths, with arrows indicating the direction of movement.*



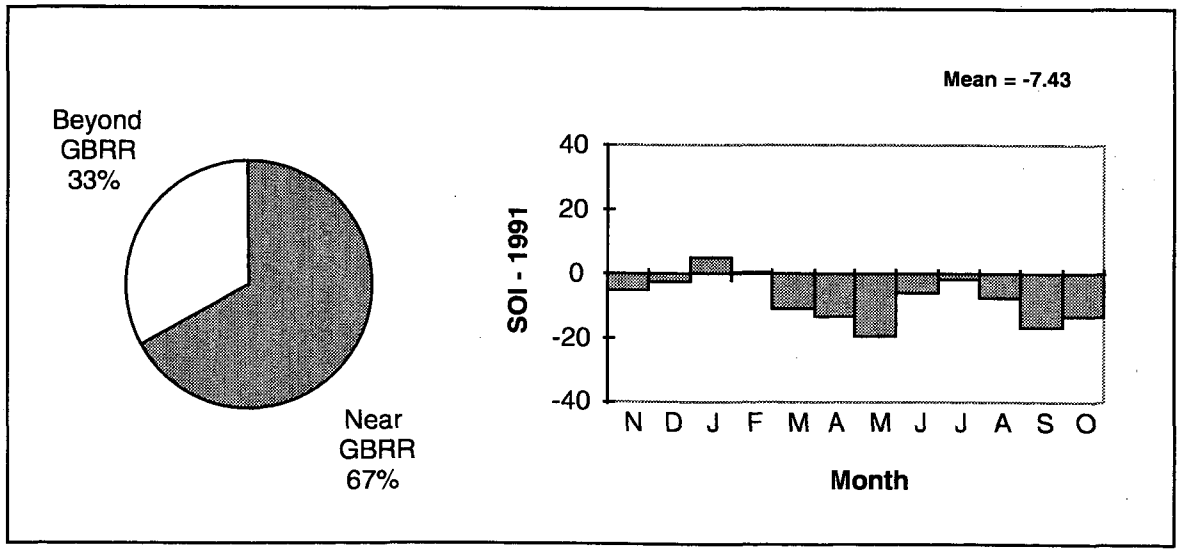
1989-1990



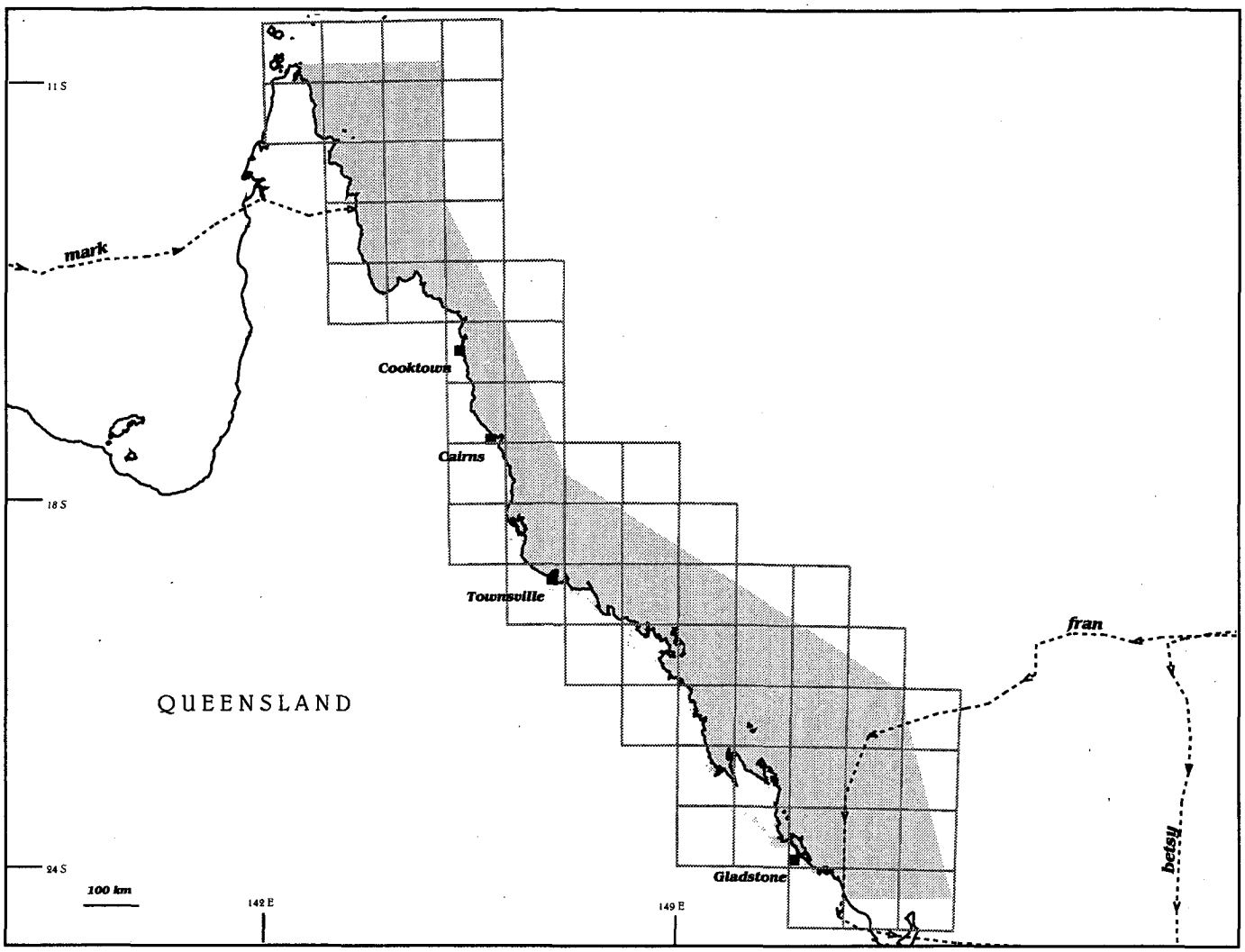
Map 88: *1990: All cyclone paths passing in the vicinity of the GBR Region. Dashed lines represent cyclone paths, with arrows indicating the direction of movement.*



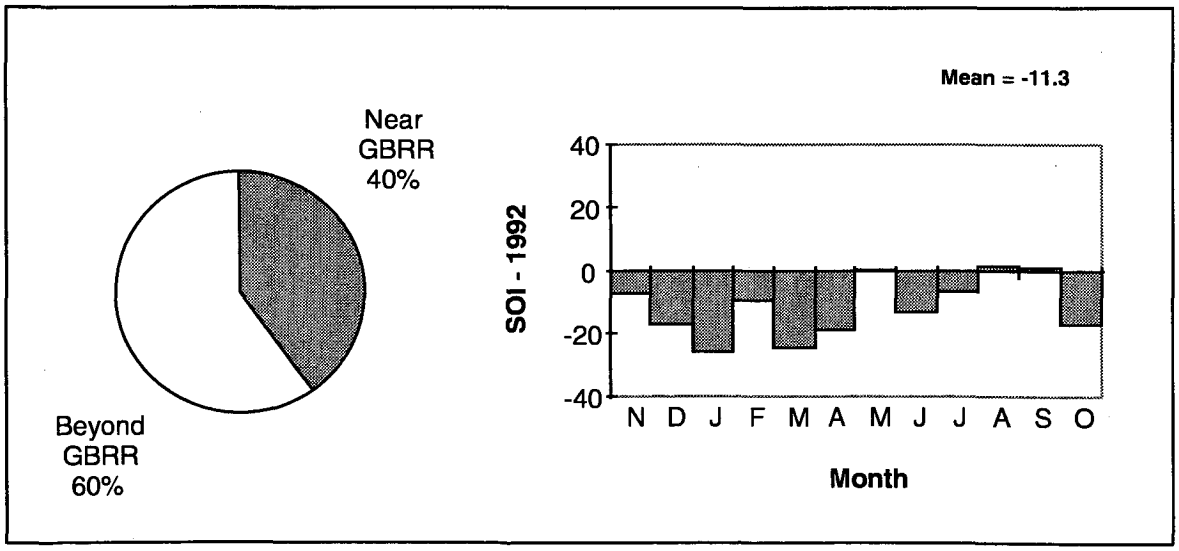
1990-1991



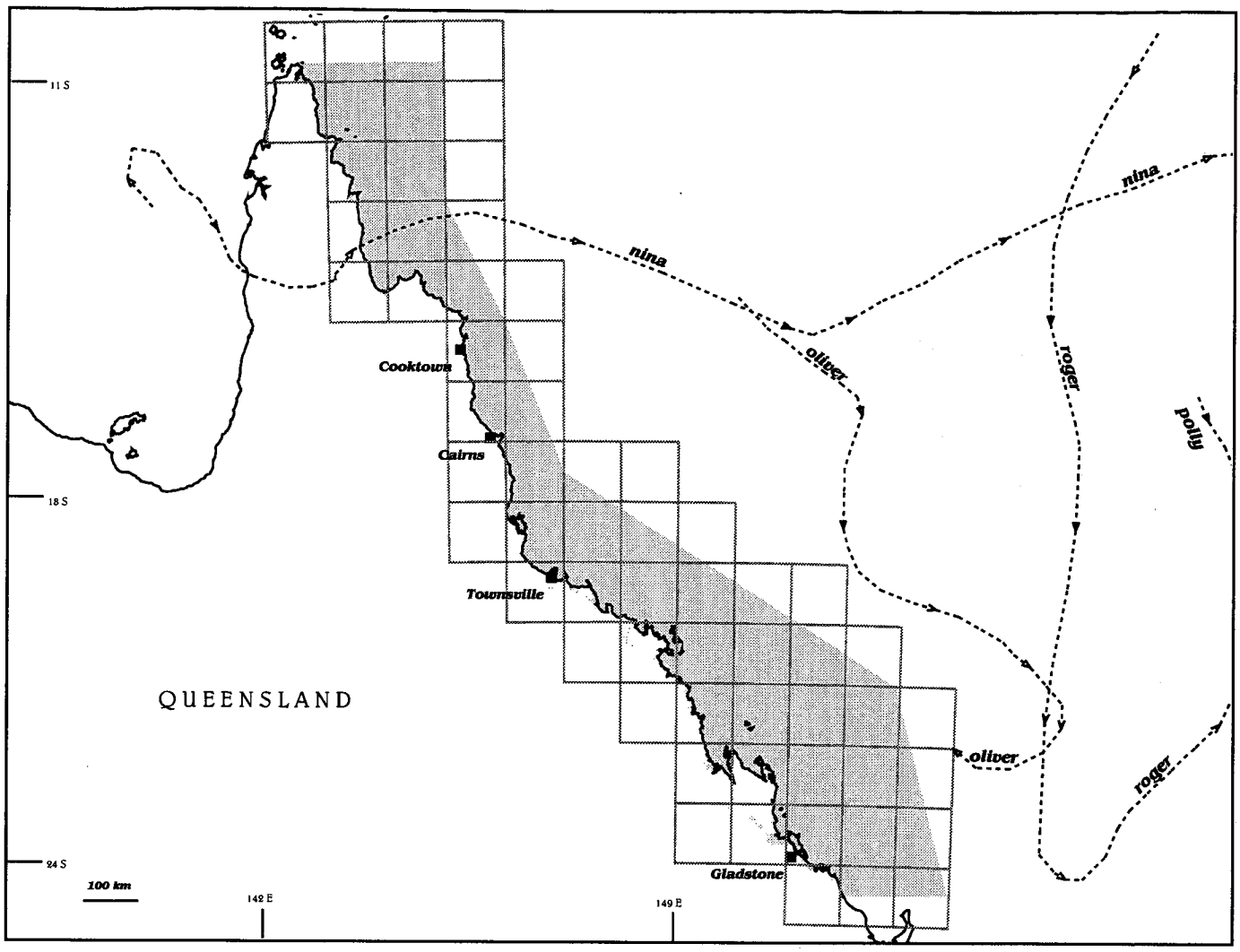
Map 89: *1991: All cyclone paths passing in the vicinity of the GBR Region. Dashed lines represent cyclone paths, with arrows indicating the direction of movement.*



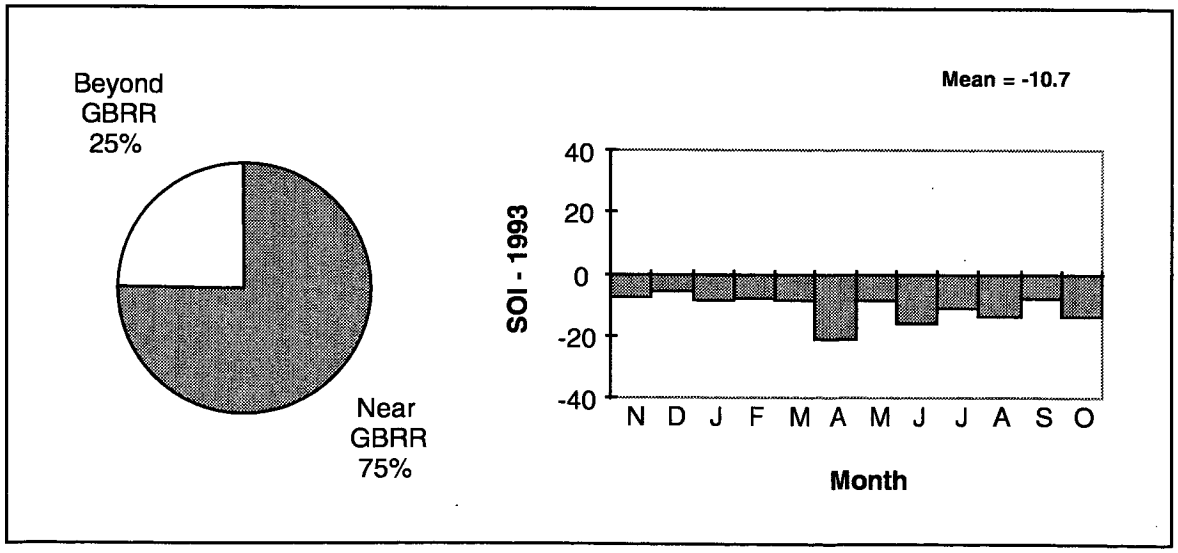
1991-1992



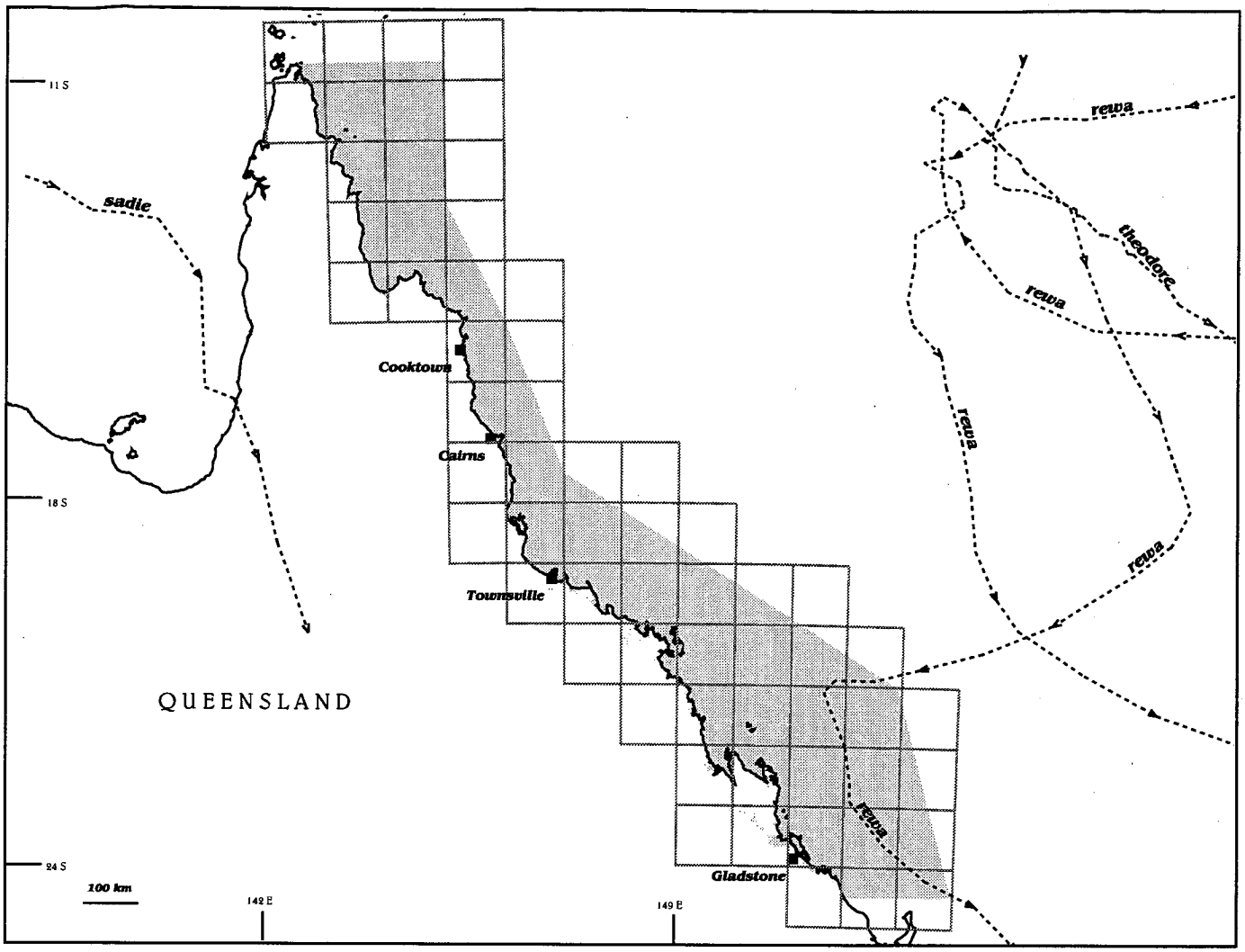
Map 90: *1992: All cyclone paths passing in the vicinity of the GBR Region. Dashed lines represent cyclone paths, with arrows indicating the direction of movement.*



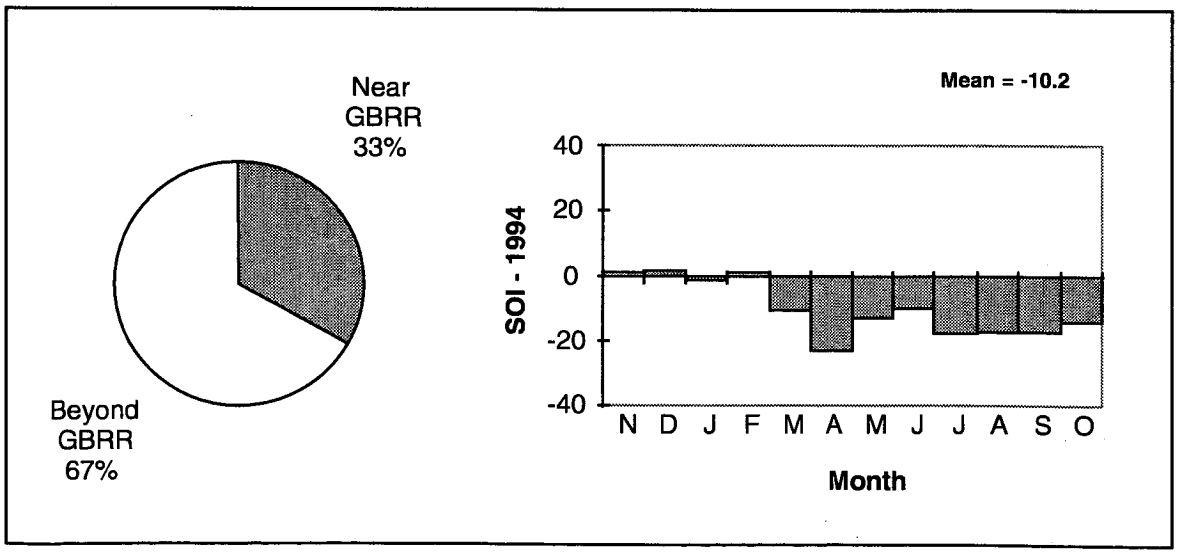
1992-1993



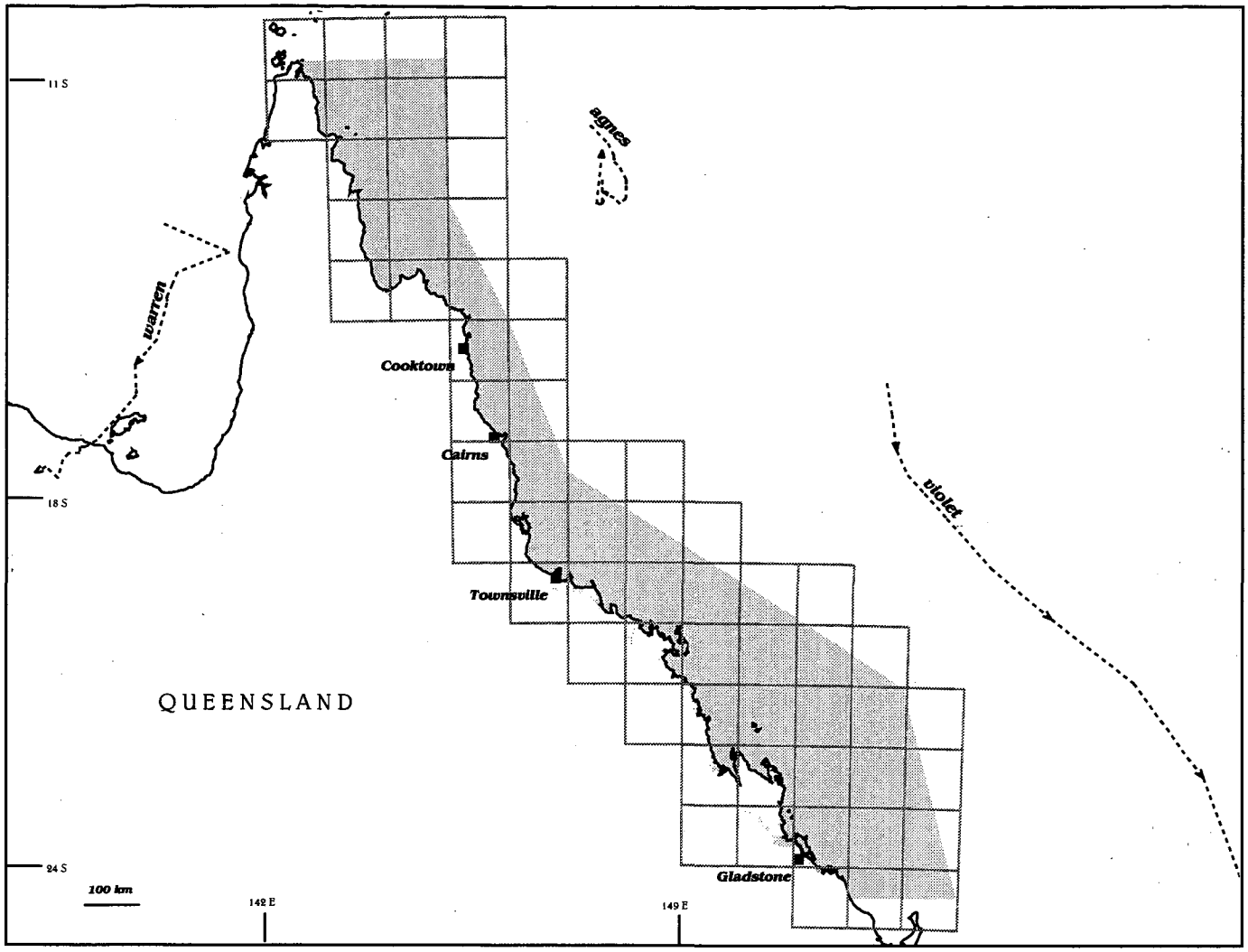
Map 91: *1993: All cyclone paths passing in the vicinity of the GBR Region. Dashed lines represent cyclone paths, with arrows indicating the direction of movement.*



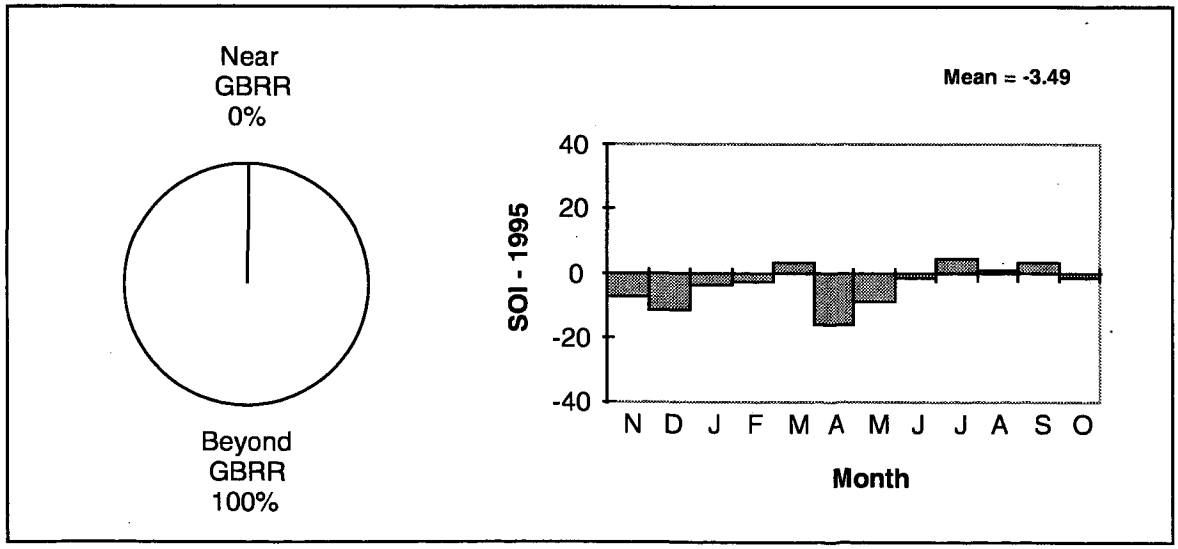
1993-1994



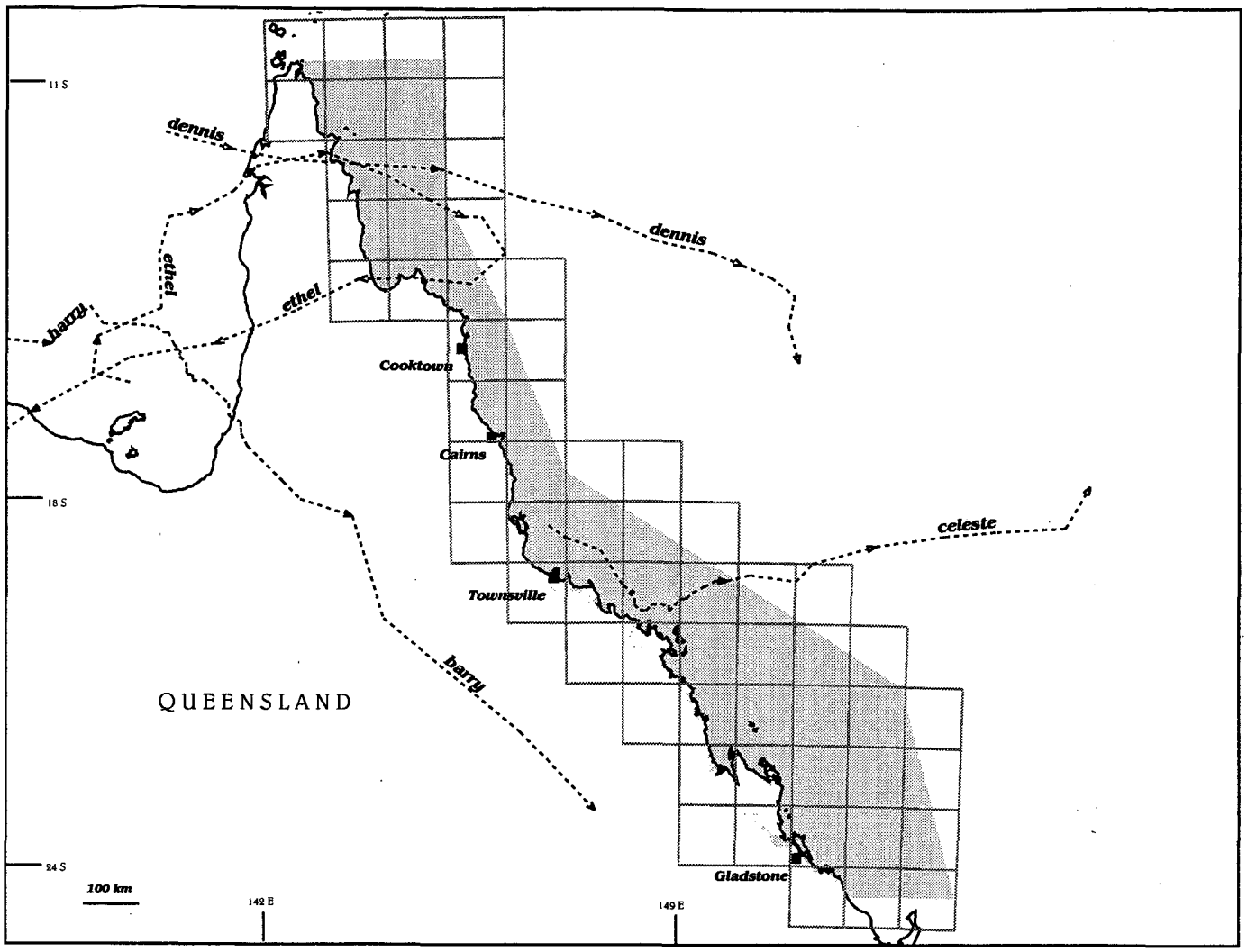
Map 92: *1994: All cyclone paths passing in the vicinity of the GBR Region. Dashed lines represent cyclone paths, with arrows indicating the direction of movement.*



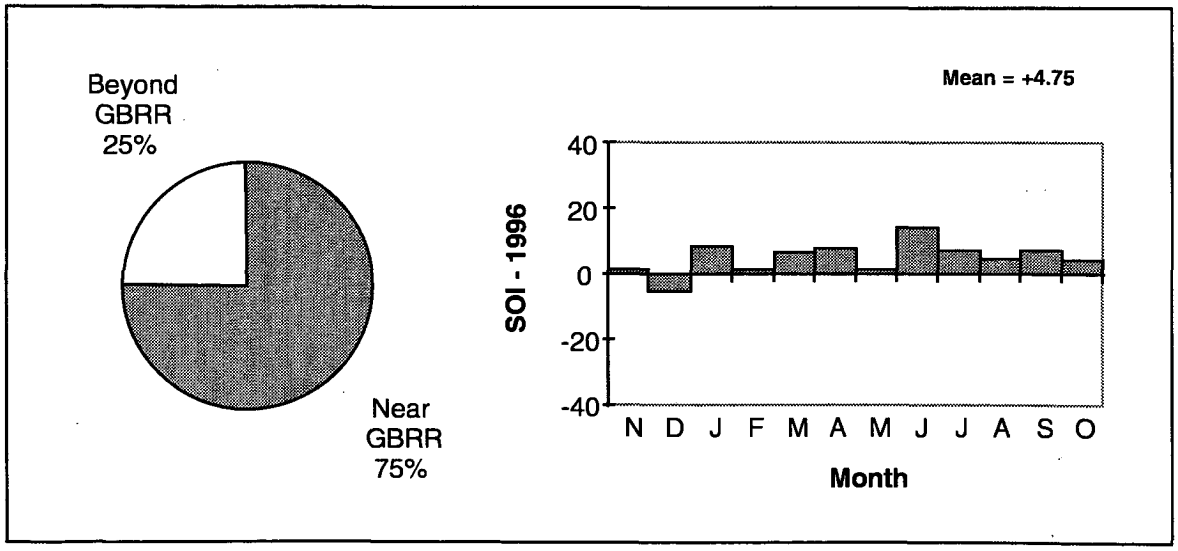
1994-1995



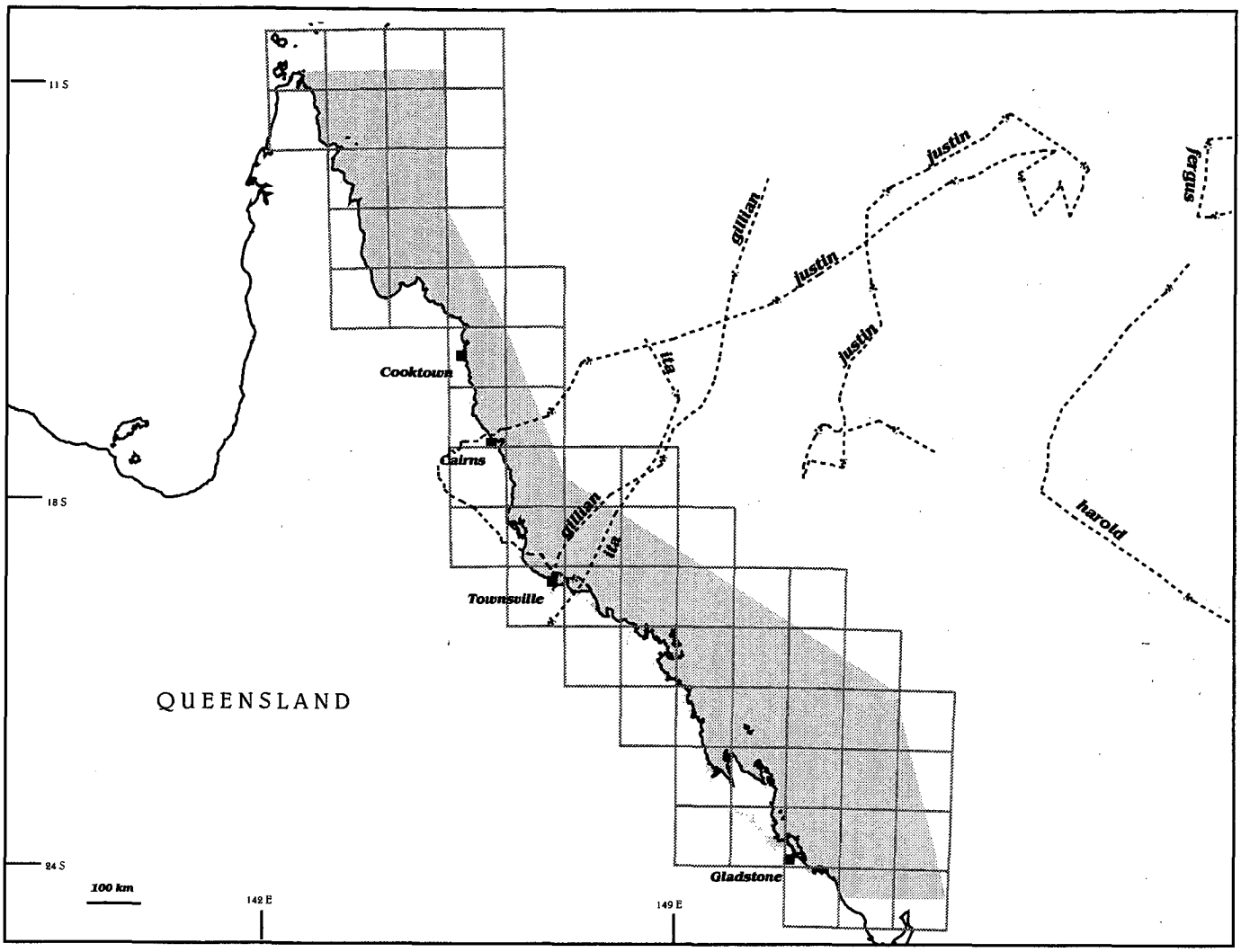
Map 93: *1995: All cyclone paths passing in the vicinity of the GBR Region. Dashed lines represent cyclone paths, with arrows indicating the direction of movement.*



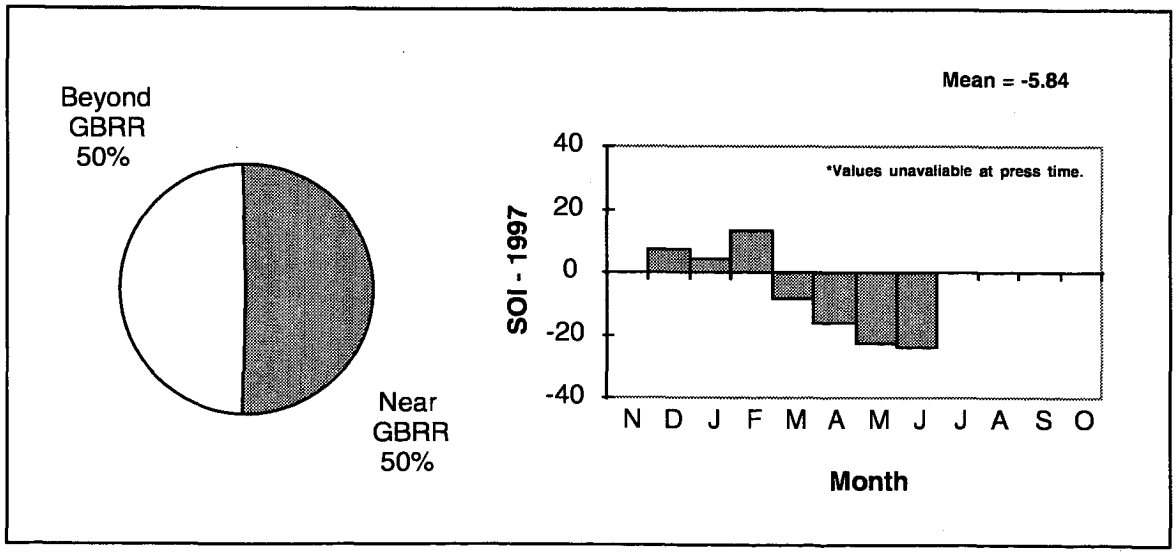
1995-1996



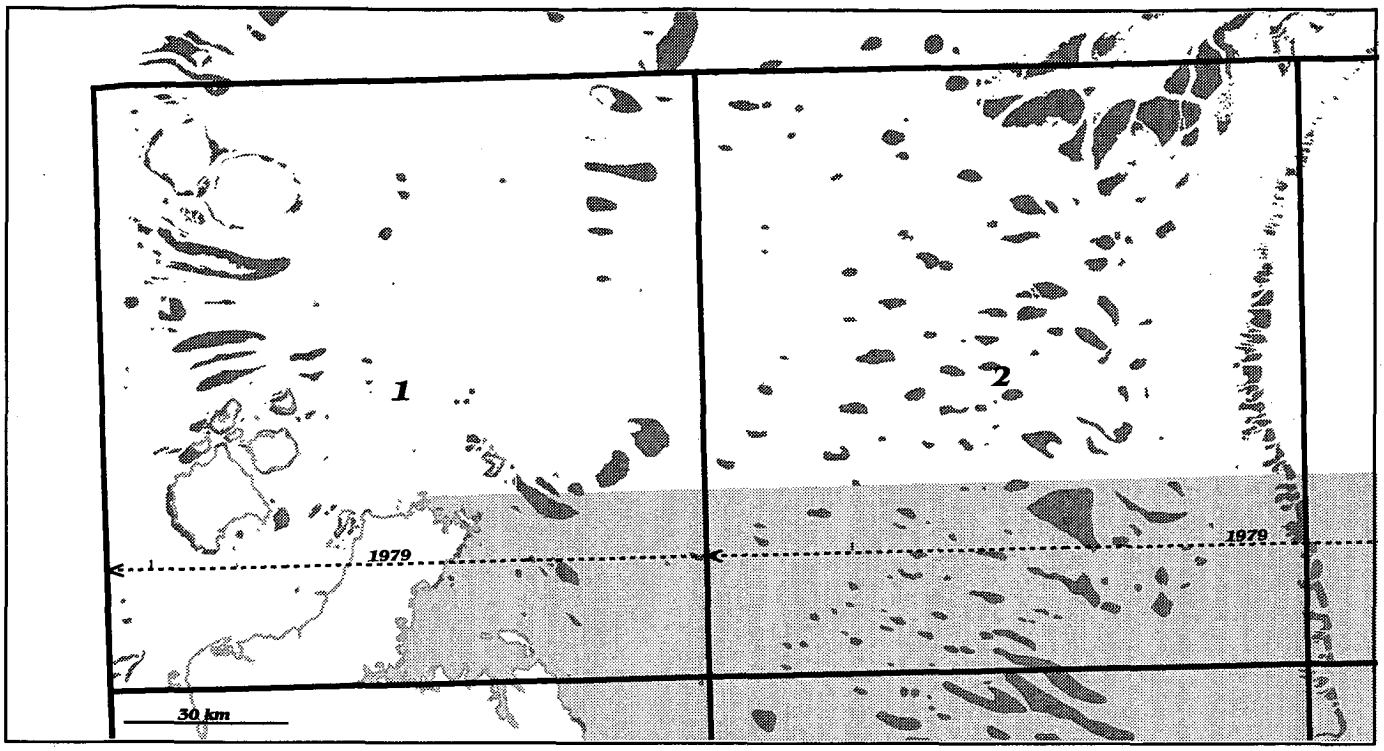
Map 94: *1996: All cyclone paths passing in the vicinity of the GBR Region. Dashed lines represent cyclone paths, with arrows indicating the direction of movement.*



1996-1997



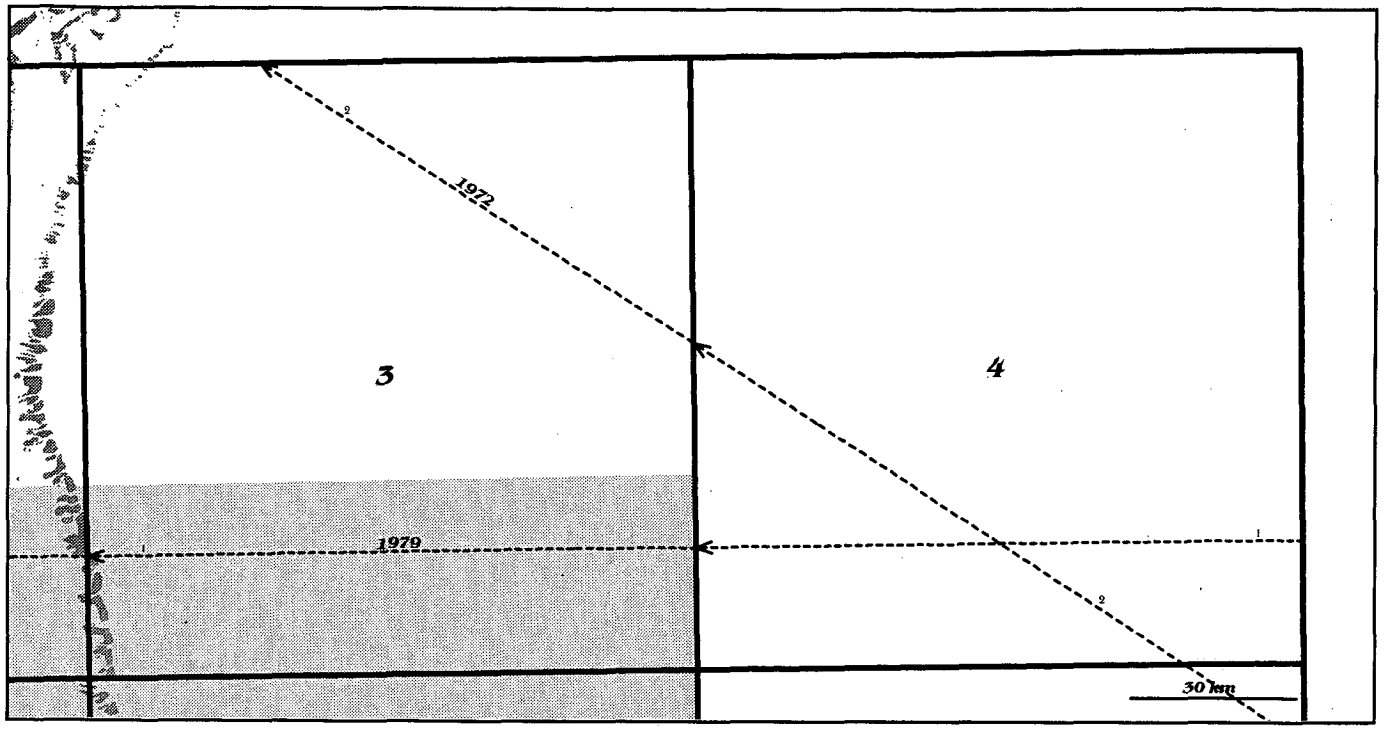
Map 95: *1997: All cyclone paths passing in the vicinity of the GBR Region. Dashed lines represent cyclone paths, with arrows indicating the direction of movement.*



Map Boxes 1 and 2

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Stan	1979	8 April	0	1003 hPa

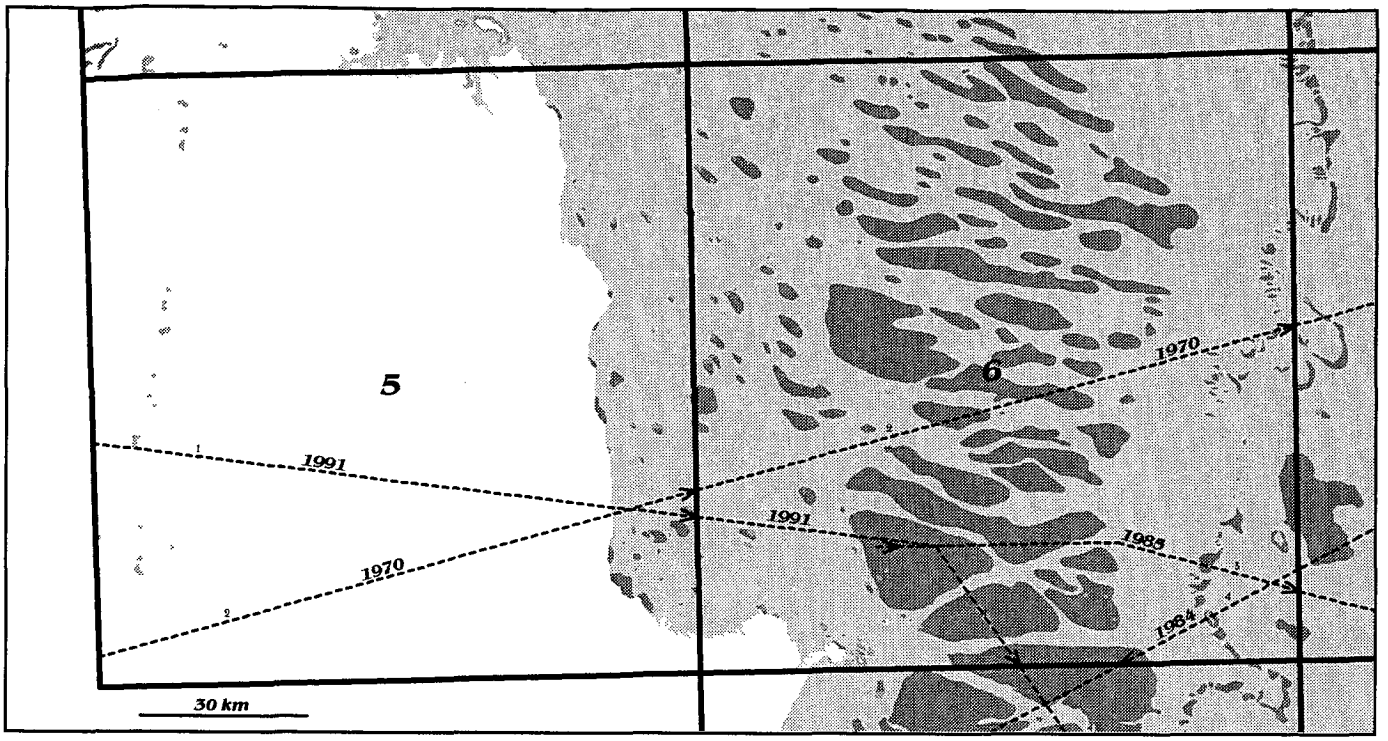
Map 96: *<u>All cyclone paths passing between 10-11^0 S and 142-144^0 E from 1969-1997</u>. The dashed lines show cyclone paths. The mainland and islands are shaded white, the GBR Region light gray and reefs dark gray.*



Map Boxes 3 and 4

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Stan	1979	7 April	0	1002 hPa
2	Faith	1972	21-22 April	0	998

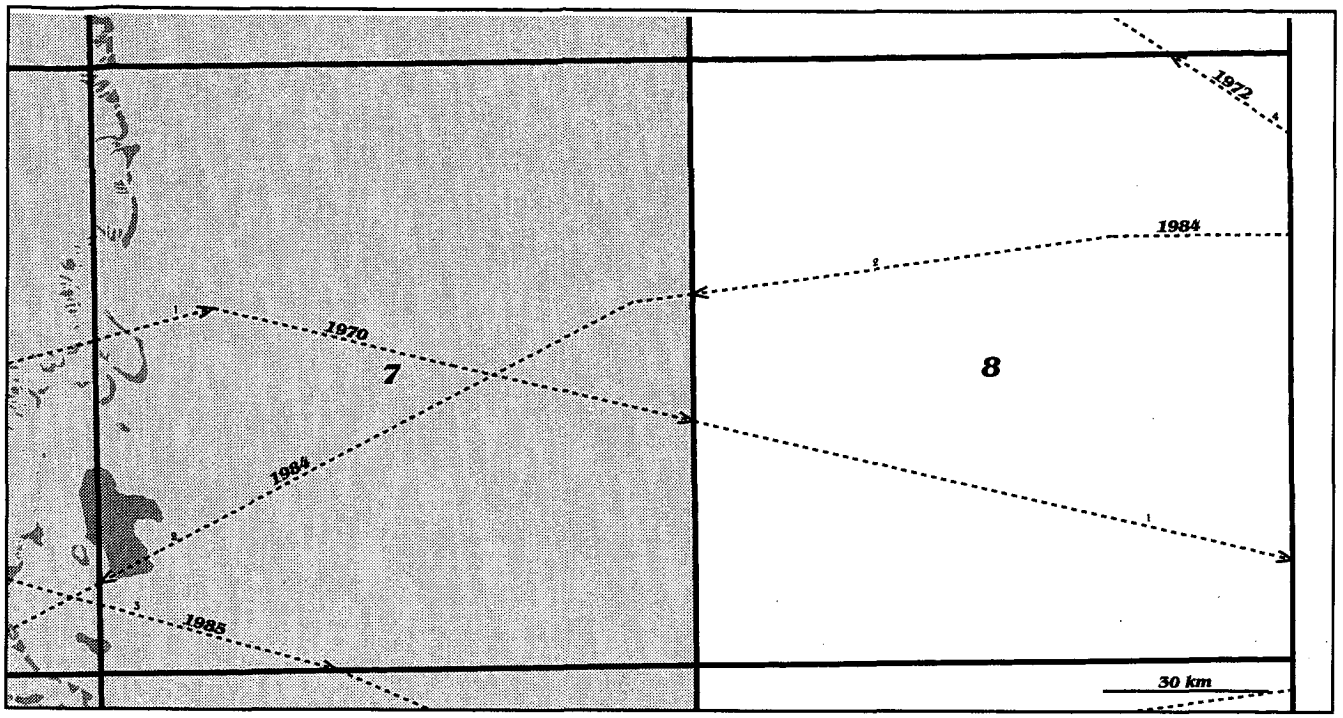
Map 97: *All cyclone paths passing between 10-11^0 S and 144-146^0 E from 1969-1997.*
The dashed lines show cyclone paths. The GBR Region is shaded light gray and reefs dark gray.



Map Boxes 5 and 6

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Kelvin	1991	24 February	0	999 hPa
2	Dawn	1970	11 February	1	994
3	Pierre	1985	18 February	0	1002
4	Jim	1984	8 March	1	990

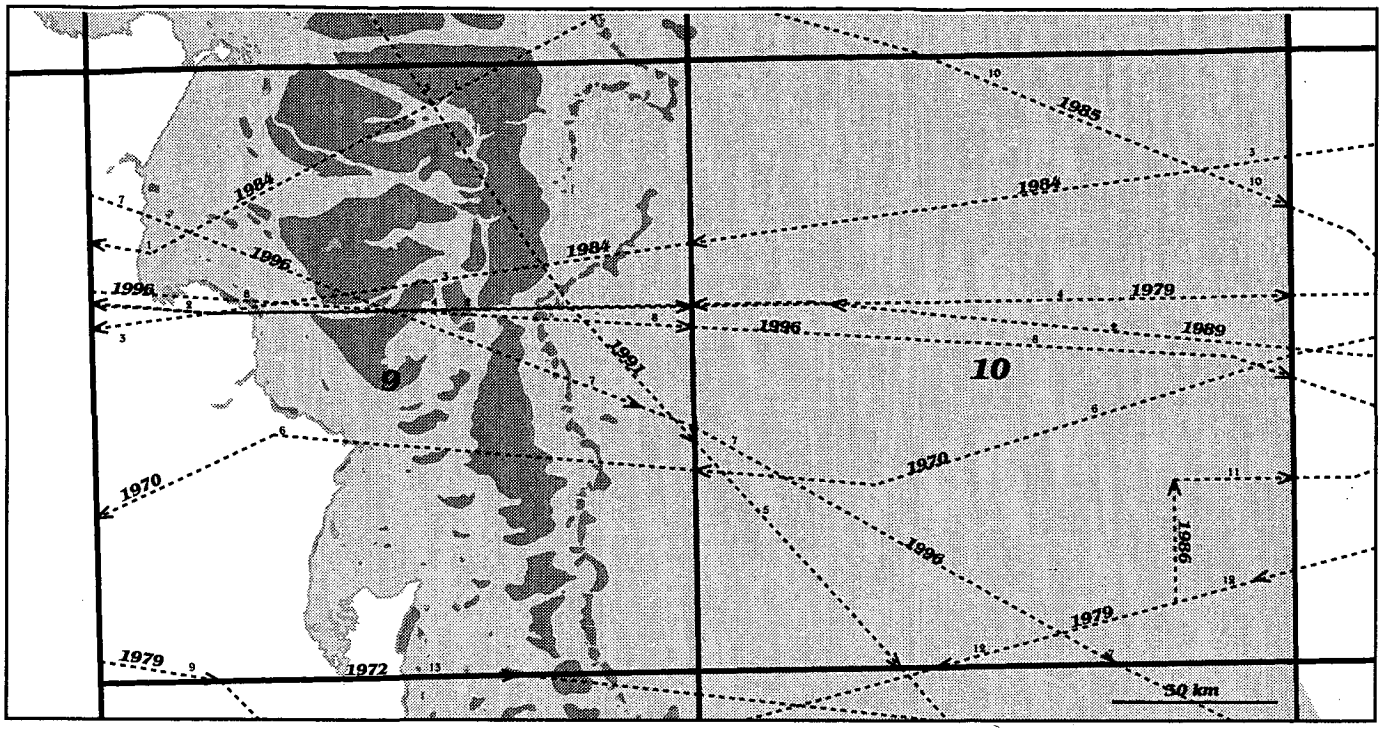
Map 98: *All cyclone paths passing between 11-12^0 S and 142-144^0 E from 1969-1997. The dashed lines show cyclone paths. The mainland and islands are shaded white, the GBR Region light gray and reefs dark gray.*



Map Boxes 7 and 8

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Dawn	1970	11 February	1	990 hPa
2	Jim	1984	7-8 March	2	980
3	Pierre	1985	18 February	0	1002
4	Faith	1972	21 April	0	998

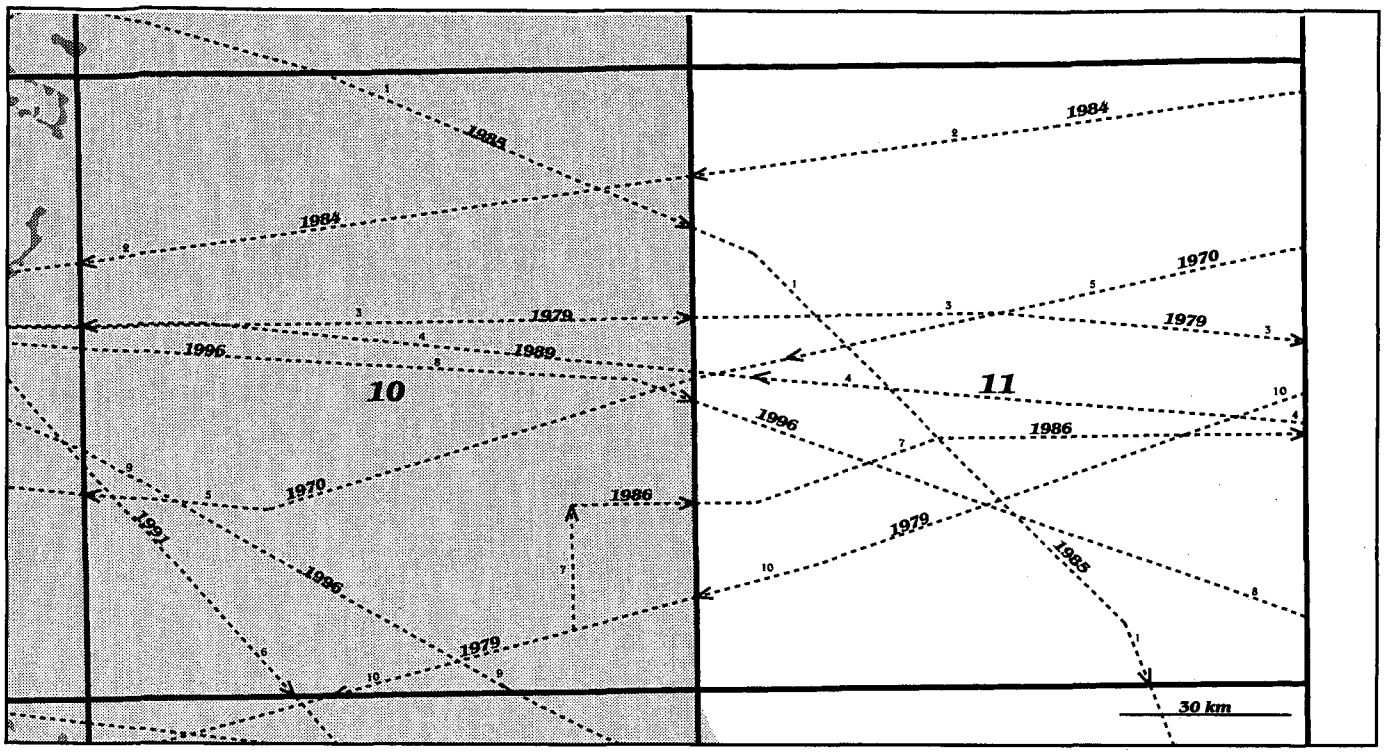
Map 99: *All cyclone paths passing between 11-12^{0}S and 144-146^{0}E from 1969-1997.*
The dashed lines show cyclone paths. The GBR Region is shaded light gray and reefs dark gray.



Map Boxes 9 and 10

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Jim	1984	8 March	1	995 hPa
2	Meena	1989	8-9 May	1	995
3	Kathy	1984	19 March	1	990
4	Stan	1979	14 April	0	1002
5	Kelvin	1991	24 February	0	999
6	Cindy	1970	14-15 March	0	1004
7	Ethel	1996	10 March	1	990
8	Dennis	1996	15-16 February	1	995
9	Greta	1979	10 January	1	990
10	Pierre	1985	18-19 February	0	1002
11	Winifred	1986	27 January	0	999
12	Rosa	1979	16 February	0	1006
13	Faith	1972	14 April	0	1002

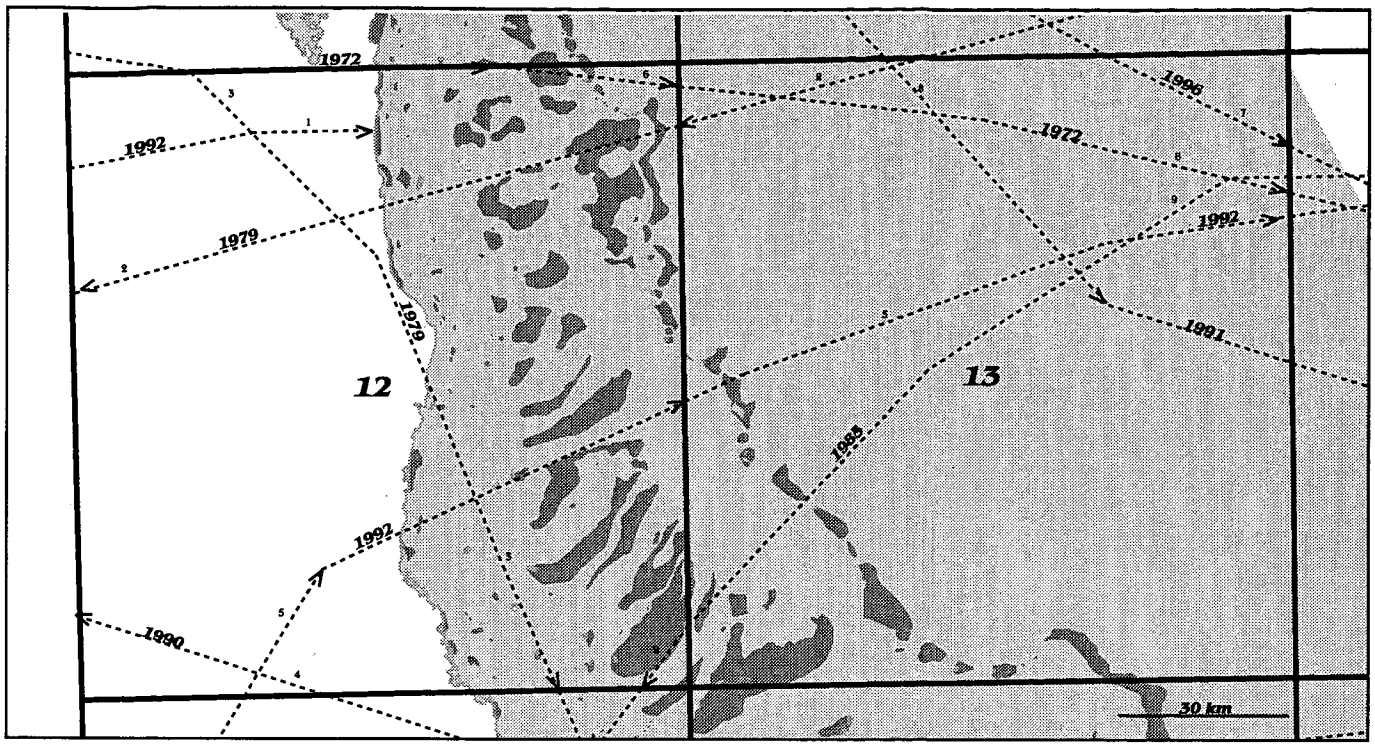
Map 100: *All cyclone paths passing between 12-13^{0}S and 143-145^{0}E from 1969-1997. The dashed lines show cyclone paths. The mainland and islands are shaded white, the GBR Region light gray and reefs dark gray.*



Map Boxes 10 and 11

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Pierre	1985	18-19 February	0	1001 hPa
2	Kathy	1984	18-19 March	1	990
3	Stan	1979	14 April	0	1000
4	Meena	1989	8 May	1	995
5	Cindy	1970	14 March	0	1003
6	Kelvin	1991	24 February	0	1000
7	Winifred	1986	27-28 January	0	1003
8	Dennis	1996	16 February	1	995
9	Ethel	1996	19 March	1	990
10	Rosa	1979	15-16 February	0	1006

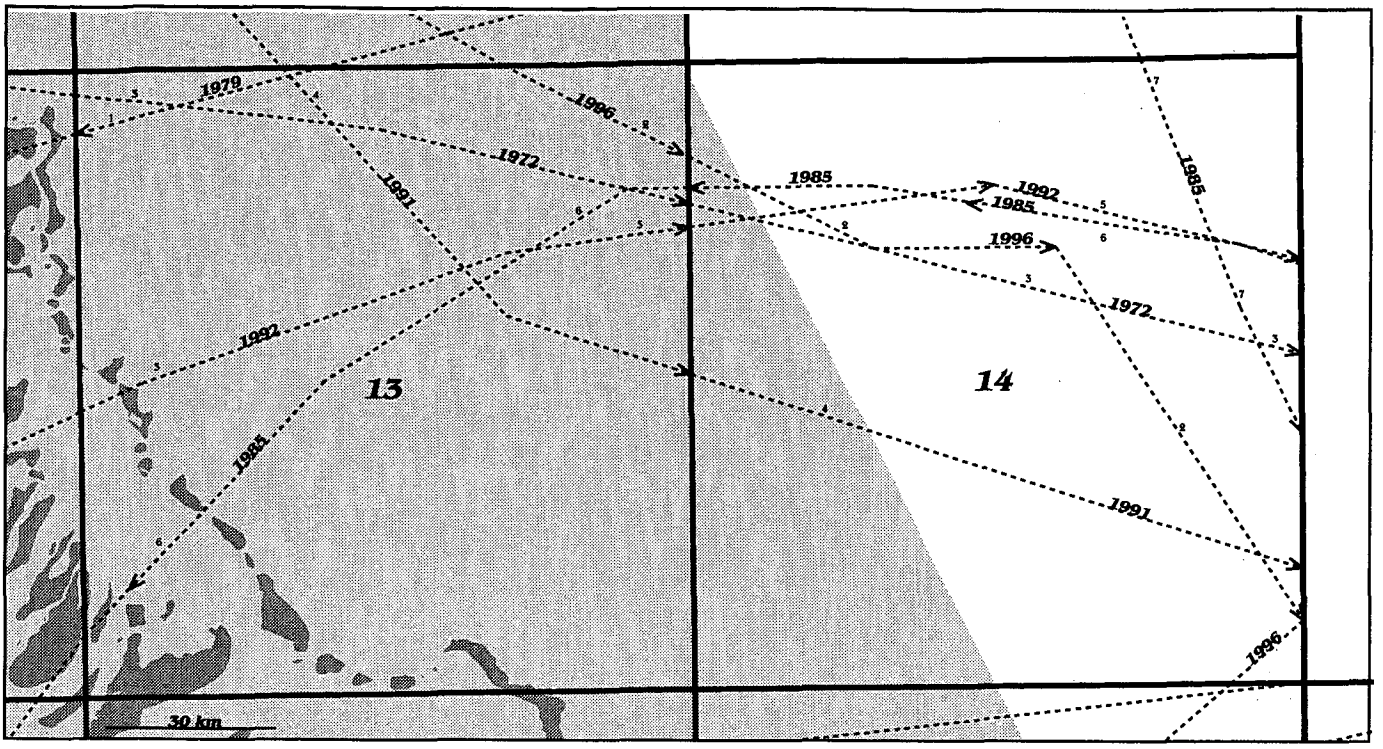
Map 101: *<u>All cyclone paths passing between 12-13^{0}S and 144-146^{0}E from 1969-1997</u>.*
The dashed lines show cyclone paths. The GBR Region is shaded light gray and reefs dark gray.



Map Boxes 12 and 13

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Mark	1992	10 January	1	995 hPa
2	Rosa	1979	16 February	0	1006
3	Greta	1979	10-11 January	1	990
4	Ivor	1990	19 March	2	983
5	Nina	1992	27 December	1	990
6	Faith	1972	14 April	0	997
7	Ethel	1996	10 March	1	990
8	Kelvin	1991	24 February	0	1000
9	Tanya	1985	31March - 1 April	1	986

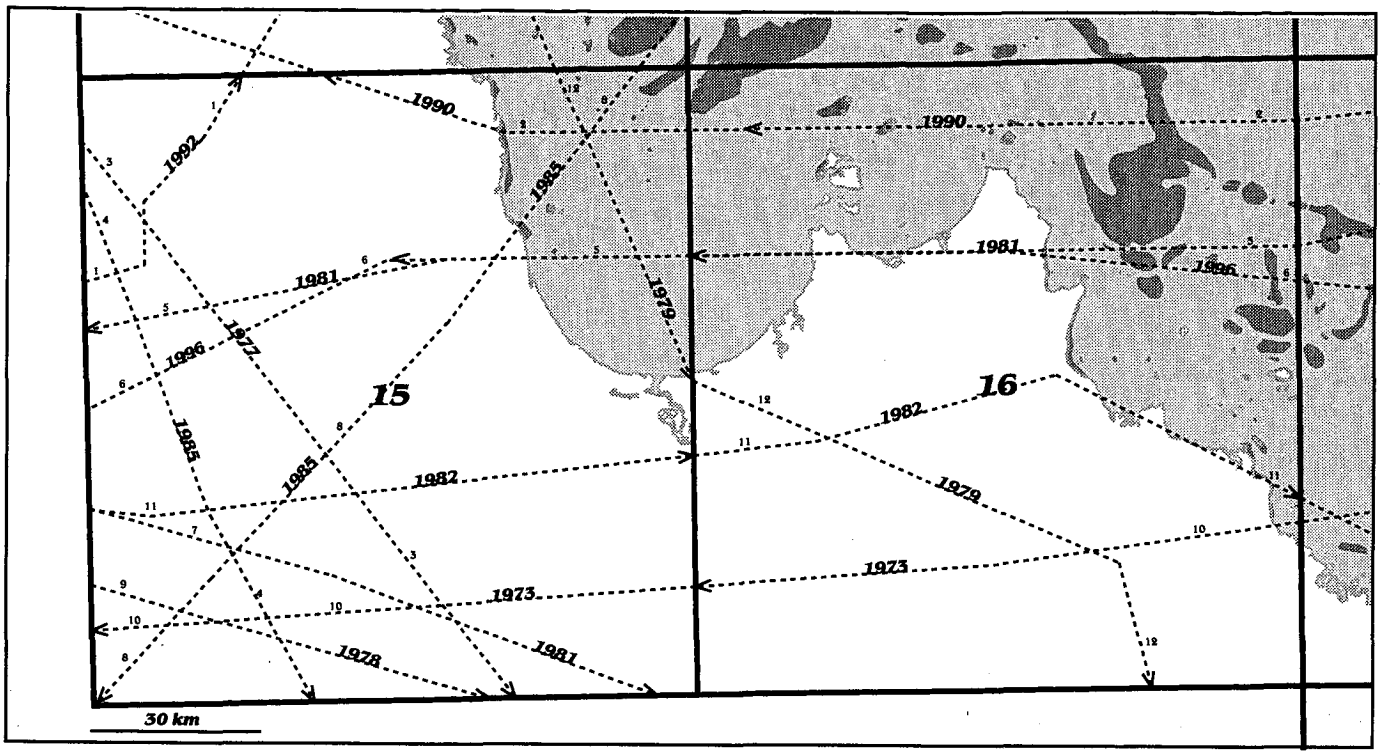
Map 102: *All cyclone paths passing between 13-14^{0}S and 143-145^{0}E from 1969-1997. The dashed lines show cyclone paths. The mainland and islands are shaded white, the GBR Region light gray and reefs dark gray.*



Map Boxes 13 and 14

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Rosa	1979	16 February	0	1006 hPa
2	Ethel	1996	10-11 March	1	990
3	Faith	1972	14 April	1	992
4	Kelvin	1991	24 February	0	1000
5	Nina	1992	27-28 December	1	990
6	Tanya	1985	31 March - 1 April	2	982
7	Pierre	1985	19 February	0	1000

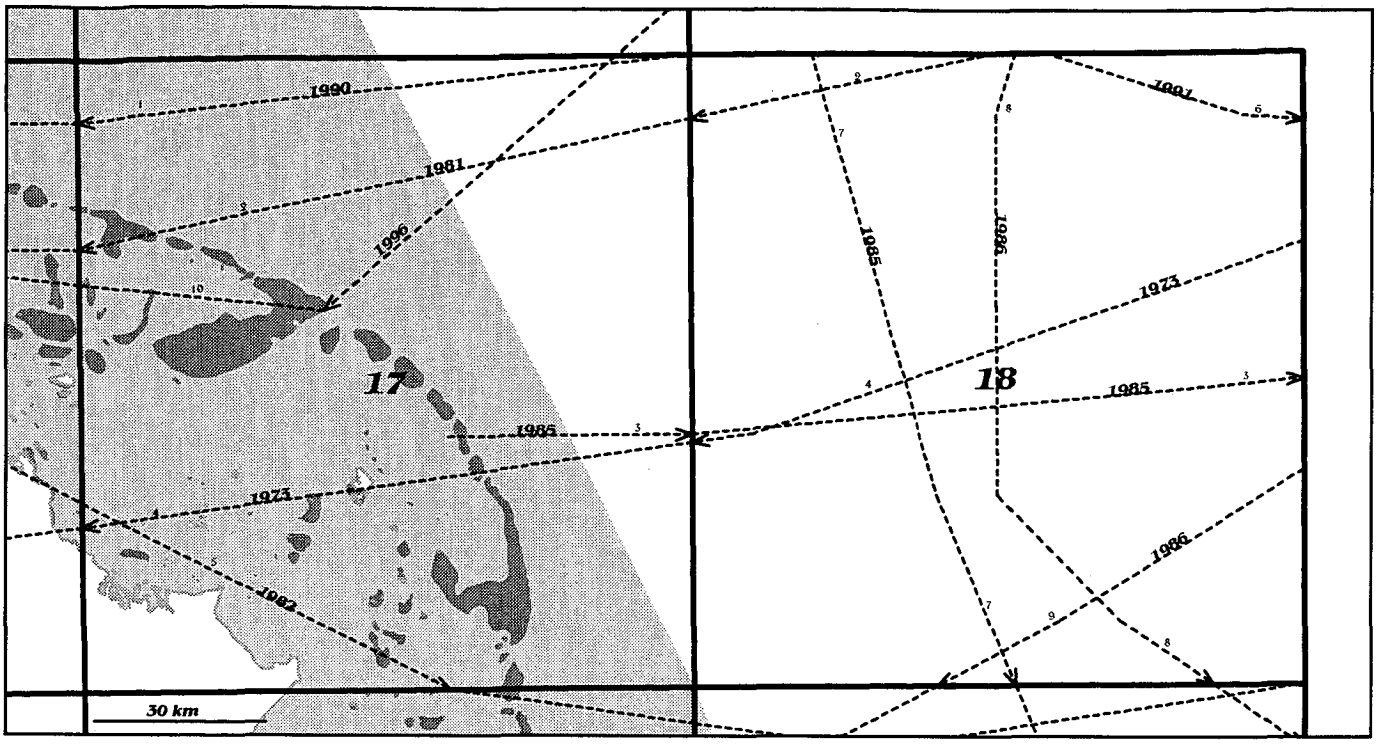
Map 103: *All cyclone paths passing between 13-14^0 S and 144-146^0 E from 1969-1997.*
The dashed lines show cyclone paths. The GBR Region is shaded light gray and reefs dark gray.



Map Boxes 15 and 16

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Nina	1992	26-27 December	1	990 hPa
2	Ivor	1990	19 March	3	970
3	Otto	1977	8 March	1	998
4	Rebecca	1985	23 February	0	1001
5	Eddie	1981	10 February	2	985
6	Ethel	1996	12 March	2	985
7	Freda	1981	25 February	1	994
8	Tanya	1985	1 April	0	999
9	Hal	1978	7 April	0	998
10	Madge	1973	4 March	0	997
11	Dominic	1982	8 April	0	995
12	Greta	1979	11 January	1	990

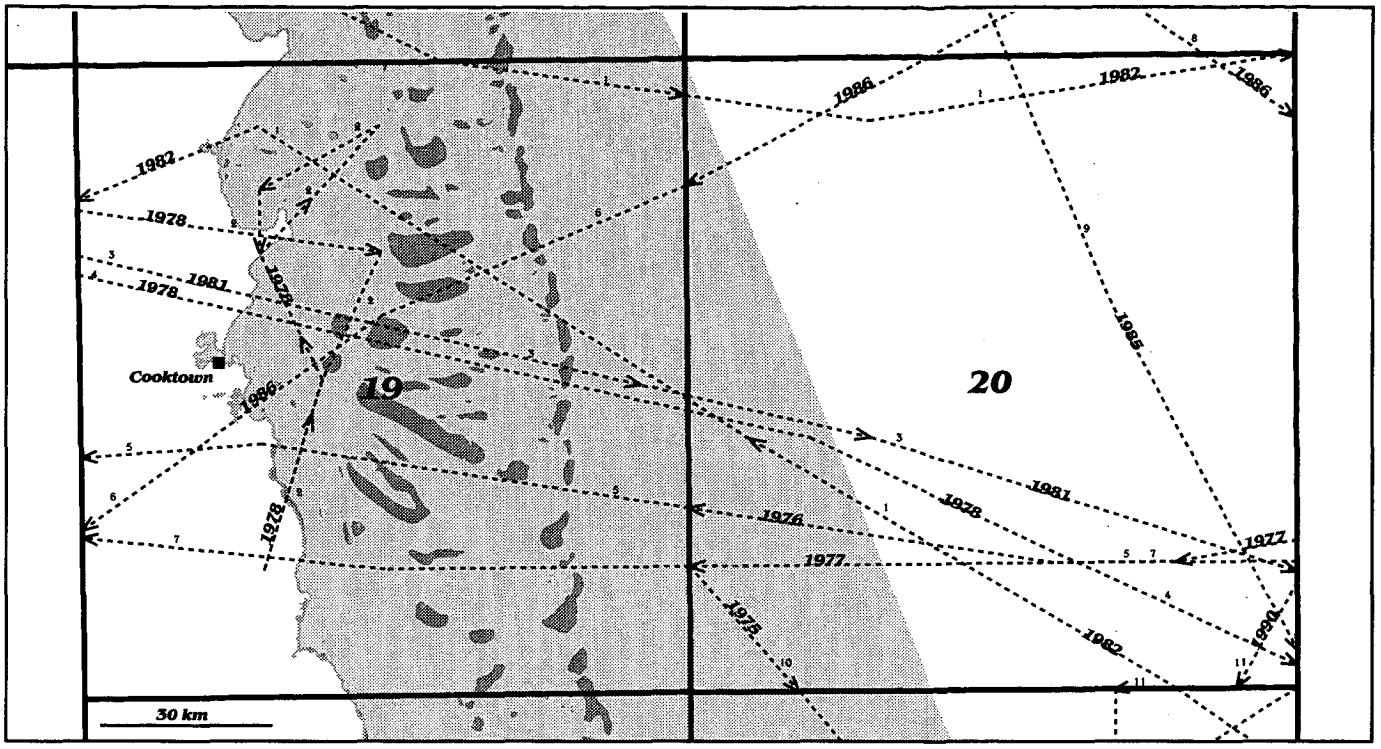
Map 104: *<u>All cyclone paths passing between 14-15^{0}S and 143-145^{0}E from 1969-1997</u>. The dashed lines show cyclone paths. The mainland and islands are shaded white, the GBR Region light gray and reefs dark gray.*



Map Boxes 17 and 18

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Ivor	1990	19 March	3	965 hPa
2	Eddie	1981	10 February	1	987
3	Odette	1985	16 January	0	1002
4	Madge	1973	4 March	0	998
5	Dominic	1982	8 April	0	1002
6	Kelvin	1991	24 February	0	1000
7	Pierre	1985	20 February	0	998
8	Winifred	1986	29-30 January	1	987
9	Manu	1986	25 April	1	994
10	Ethel	1996	11 March	1	988

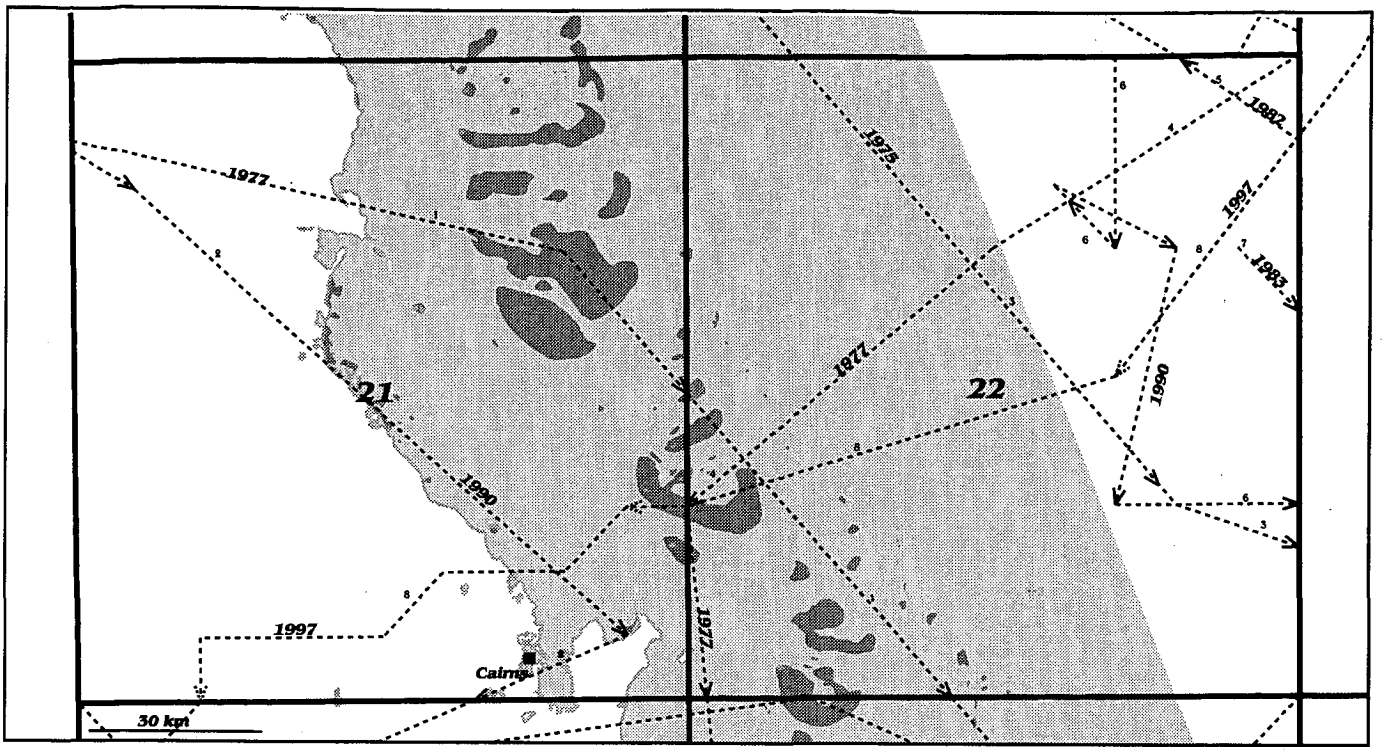
Map 105: *All cyclone paths passing between 14-15^{0}S and 145-147^{0}E from 1969-1997. The dashed lines show cyclone paths. The mainland and islands are shaded white, the GBR Region light gray and reefs dark gray.*



Map Boxes 19 and 20

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Dominic	1982	8-14 April	0	1000 hPa
2	Peter	1978	1-3 January	1	993
3	Freda	1981	26 February	1	992
4	Hal	1978	8 April	0	998
5	Alan	1976	1 February	1	995
6	Manu	1986	26 April	0	996
7	Nancy	1977	12-13 February	0	998
8	Winifred	1986	30 January	2	983
9	Pierre	1985	20 February	1	995
10	Gloria	1975	15 January	1	993
11	Joy	1990	22 December	3	945

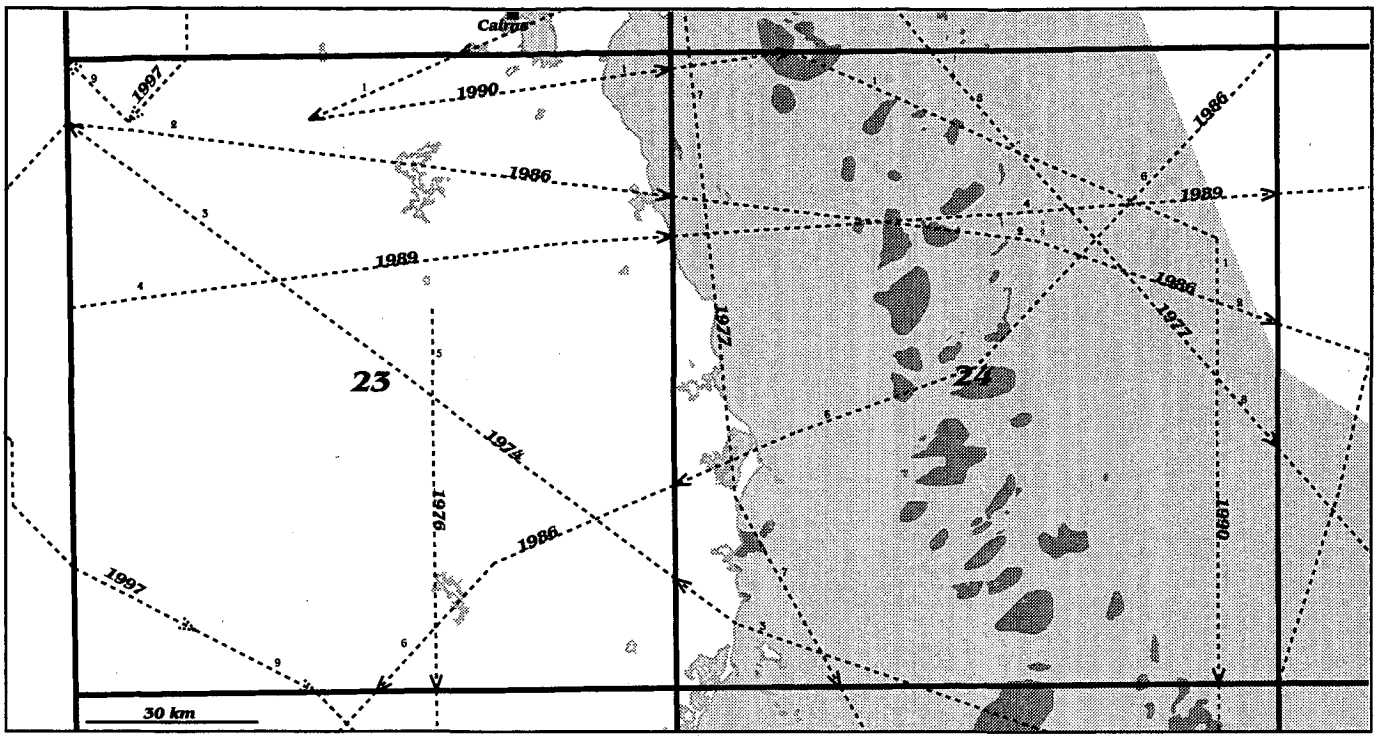
Map 106: *All cyclone paths passing between 15-16^{0}S and 145-147^{0}E from 1969-1997. The dashed lines show cyclone paths. The mainland and islands are shaded white, the GBR Region light gray and reefs dark gray.*



Map Boxes 21 and 22

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Otto	1977	8 March	1	987 hPa
2	Ivor	1990	22-23 March	0	999
3	Gloria	1975	16 January	1	992
4	Keith	1977	30-31 January	1	992
5	Dominic	1982	13 April	0	1006
6	Joy	1990	23-24 December	4	940
7	Des	1983	14 January	0	1003
8	Justin	1997	21-22 March	2	990

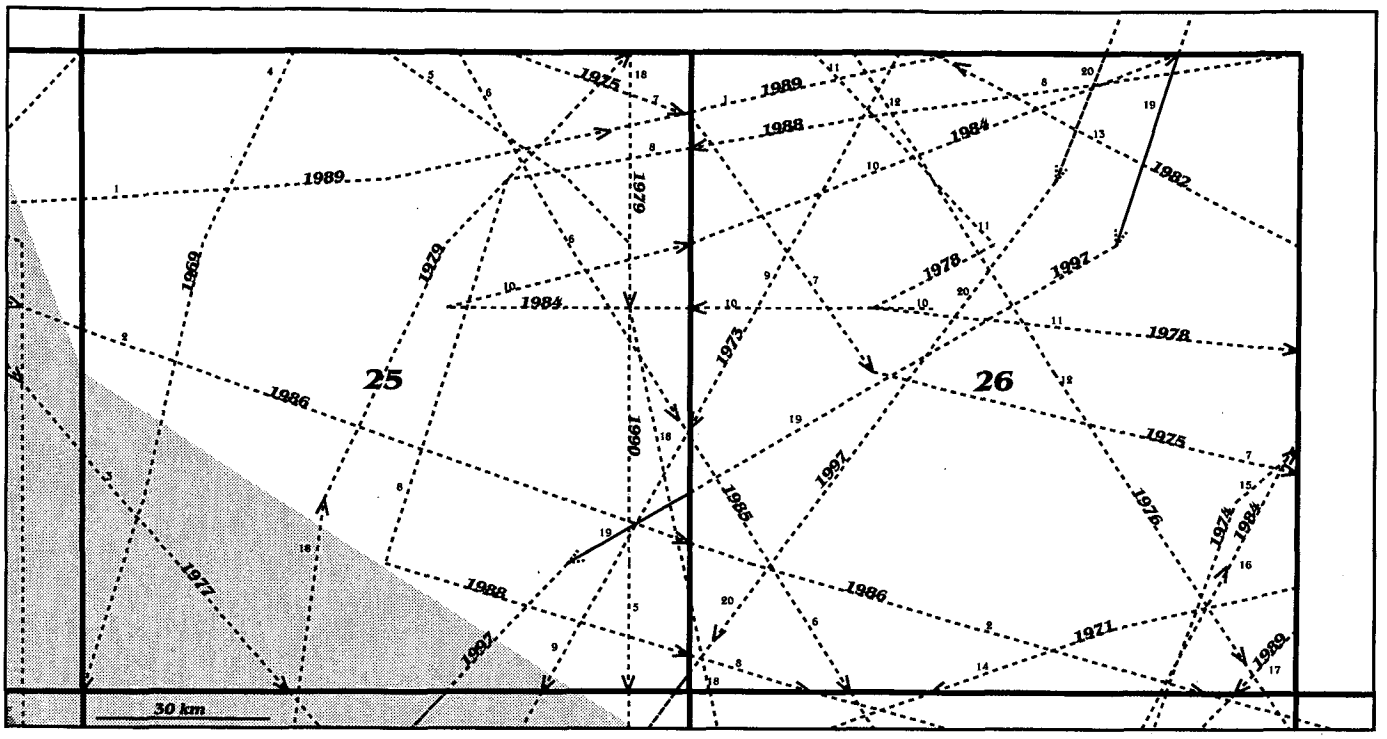
Map 107: *All cyclone paths passing between 16-17^{0}S and 145-147^{0}E from 1969-1997. The dashed lines show cyclone paths. The mainland and islands are shaded white, the GBR Region light gray and reefs dark gray.*



Map Boxes 23 and 24

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Ivor	1990	23 March	0	999 hPa
2	Vernon	1986	23 January	1	995
3	Yvonne	1974	10 February	1	995
4	Felicity	1989	16 December	0	999
5	Dawn	1976	4 March	0	997
6	Winifred	1986	1 February	3	957
7	Keith	1977	31 January	1	994
8	Otto	1977	8-9 March	1	987
9	Justin	1997	22-23 March	0	997

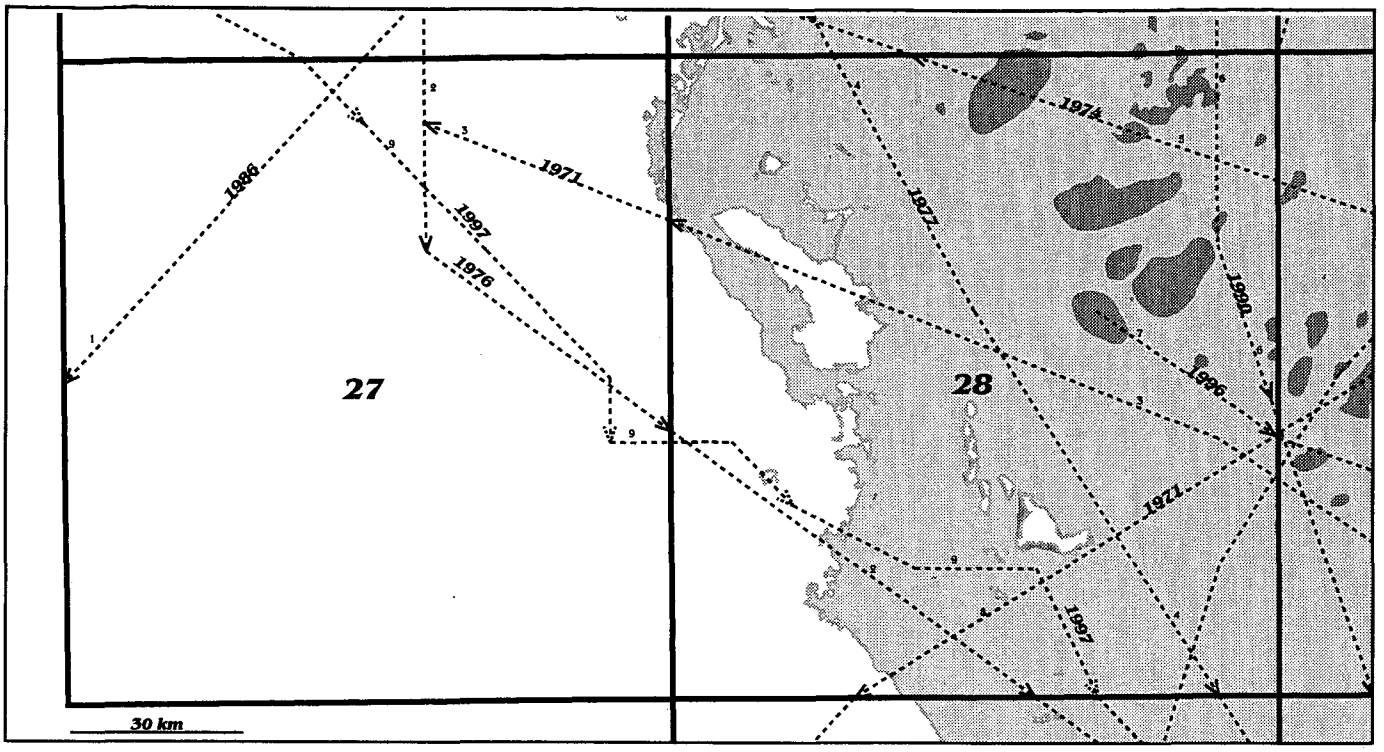
Map 108: *All cyclone paths passing between 17-18^{0}S and 145-147^{0}E from 1969-1997. The dashed lines show cyclone paths. The mainland and islands are shaded white, the GBR Region light gray and reefs dark gray.*



Map Boxes 25 and 26

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Felicity	1989	16 December	0	999 hPa
2	Vernon	1986	23 January	1	995
3	Otto	1977	8-9 March	1	987
4	Bridget	1969	26-27 January	0	1004
5	Joy	1990	25 December	2	980
6	Pierre	1985	20 February	1	991
7	Gloria	1975	16 January	2	984
8	Delilah	1988	30 December	0	999
9	Una	1973	18 December	1	992
10	Ingrid	1984	20 February	0	1001
11	Hal	1978	8-9 April	0	998
12	Watorea	1976	27 April	2	978
13	Dominic	1982	13 April	0	1004
14	Althea	1971	23 December	3	952
15	Vera	1974	19 January	0	996
16	Grace	1984	11 January	0	1004
17	Aivu	1989	3 April	4	942
18	Kerry	1979	2-3 March	1	998
19	Gillian	1997	11 February	1	998
20	Ita	1997	25 February	1	996

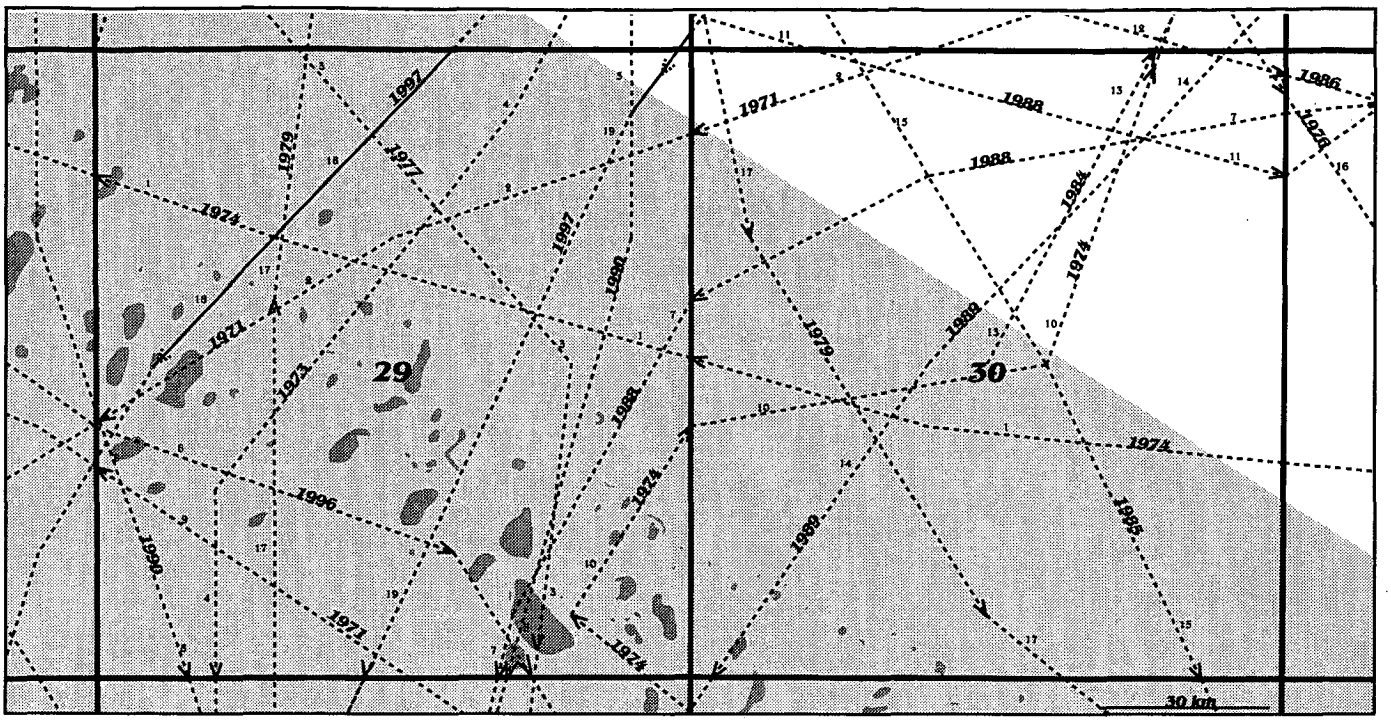
Map 109: *<u>All cyclone paths passing between 17-18^{0}S and 147-149^{0}E from 1969-1997</u>.*
The dashed lines show cyclone paths. The GBR Region is shaded light gray and reefs dark gray.



Map Boxes 27 and 28

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Winifred	1986	1 February	2	982 hPa
2	Dawn	1976	4 March	1	995
3	Gertie	1971	15-16 February	1	988
4	Keith	1977	31 January	1	994
5	Yvonne	1974	9-10 February	1	995
6	Ivor	1990	24 March	0	1000
7	Celeste	1996	26 January	1	995
8	Althea	1971	24 December	3	952
9	Justin	1997	23 March	0	999

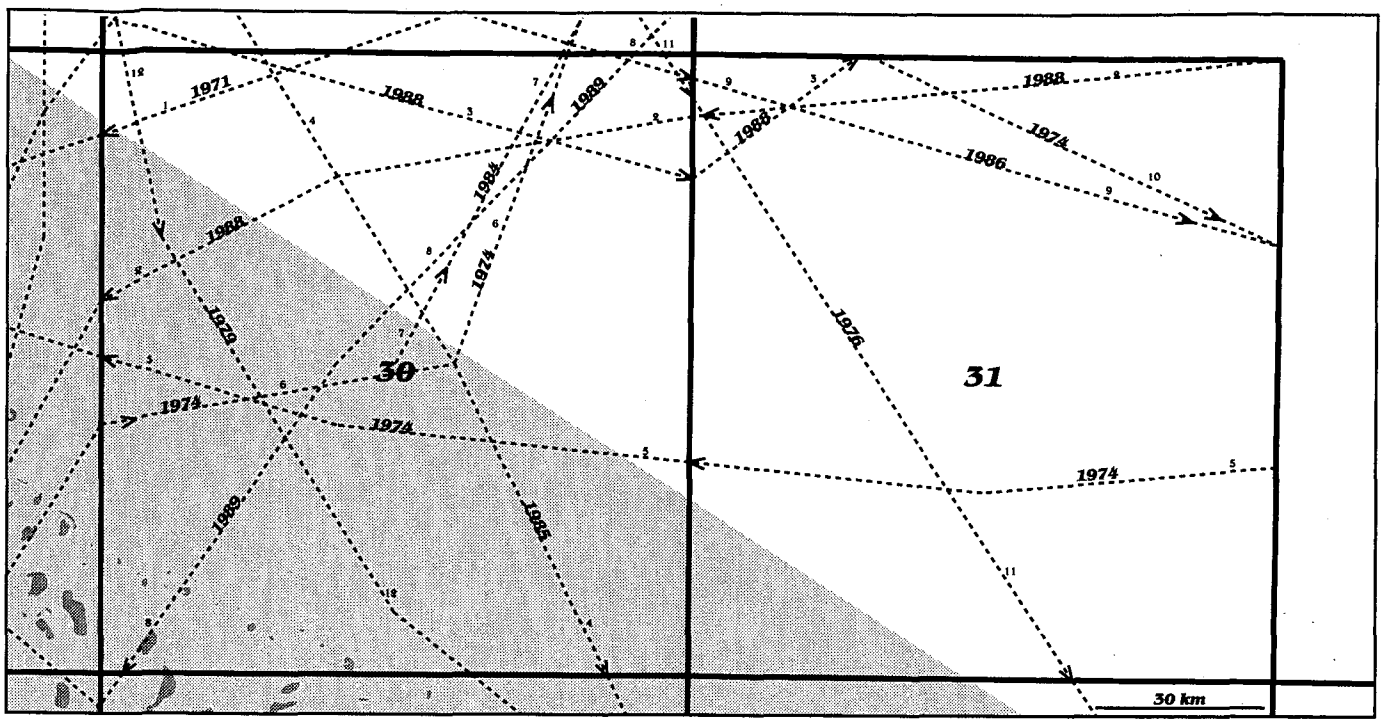
Map 110: *All cyclone paths passing between 18-19^0 S and 144-146^0 E from 1969-1997. The dashed lines show cyclone paths. The mainland and islands are shaded white, the GBR Region light gray and reefs dark gray.*



Map Boxes 29 and 30

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Yvonne	1974	9 February	0	999 hPa
2	Althea	1971	23 December	3	952
3	Otto	1977	9 March	1	987
4	Una	1973	18 December	1	989
5	Joy	1990	26 December	2	980
6	Celeste	1996	26 January	1	995
7	Charlie	1988	28 February	2	985
8	Ivor	1990	24 March	0	1000
9	Gertie	1971	15 February	1	988
10	Vera	1974	18-19 January	0	996
11	Delilah	1988	30 December	0	998
12	Vernon	1986	23 January	1	995
13	Grace	1984	11 January	0	1007
14	Aivu	1989	3 April	3	948
15	Pierre	1985	21 February	1	986
16	Watorea	1976	27 April	2	978
17	Kerry	1979	2-4 March	1	995
18	Gillian	1997	12 February	0	1002
19	Ita	1997	24 February	1	995

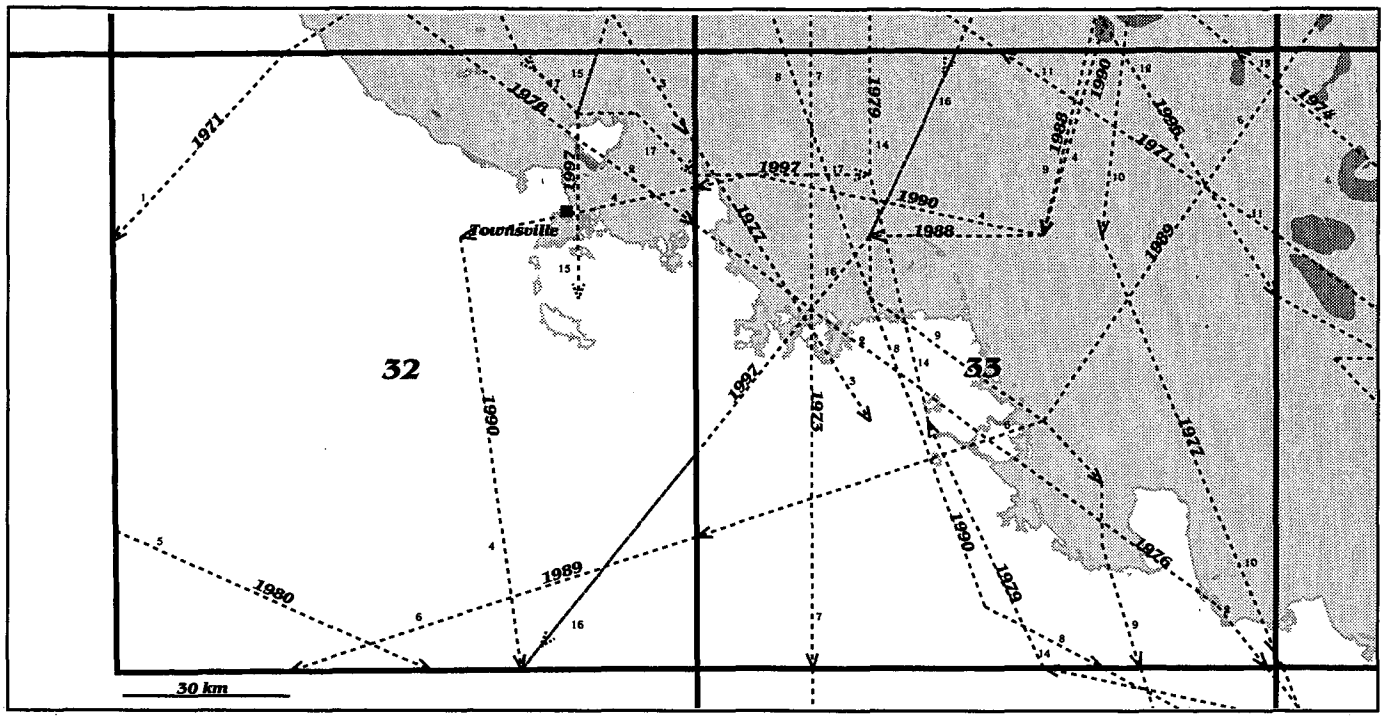
Map 111: *<u>All cyclone paths passing between 18-19^{0}S and 147-149^{0}E from 1969-1997</u>.*
The dashed lines show cyclone paths. The GBR Region is shaded light gray and reefs dark gray.



Map Boxes 30 and 31

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Althea	1971	23 December	3	952 hPa
2	Charlie	1988	28 February	2	985
3	Delilah	1988	30 December	0	998
4	Pierre	1985	21 February	1	986
5	Yvonne	1974	9 February	0	1002
6	Vera	1974	18-19 January	0	988
7	Grace	1984	11 January	0	1007
8	Aivu	1989	3 April	3	948
9	Vernon	1986	23 January	1	991
10	Wanda	1974	21 January	0	1003
11	Watorea	1976	27 April	2	978
12	Kerry	1979	4 March	1	995

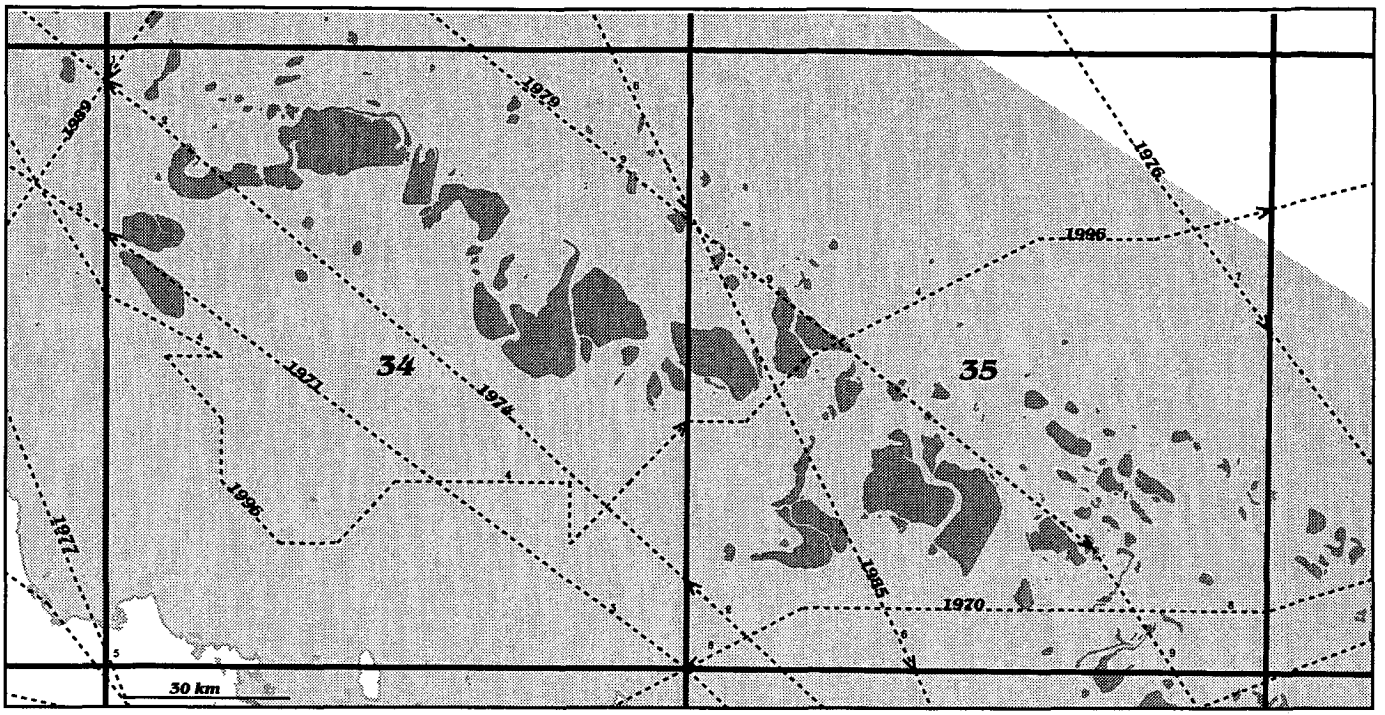
Map 112: *All cyclone paths passing between 18-19^{0}S and 148-150^{0}E from 1969-1997.*
The dashed lines show cyclone paths. The GBR Region is shaded light gray and reefs dark gray.



Map Boxes 32 and 33

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Althea	1971	24 December	3	952 hPa
2	Dawn	1976	4 March	1	995
3	Keith	1977	31 January - 1 Feb.	1	994
4	Joy	1990	26-27 December	2	983
5	Paul	1980	6 January	0	995
6	Aivu	1989	4 April	3	955
7	Una	1973	18 December	1	988
8	Ivor	1990	24 March	0	1000
9	Charlie	1988	29 February	3	972
10	Otto	1977	9 March	1	987
11	Gertie	1971	15 February	1	988
12	Celeste	1996	26 January	0	995
13	Vera	1974	18-19 January	0	996
14	Kerry	1979	1-2 March	0	998
15	Gillian	1997	12 February	0	1005
16	Ita	1997	24 February	1	994
17	Justin	1997	23 March	0	999

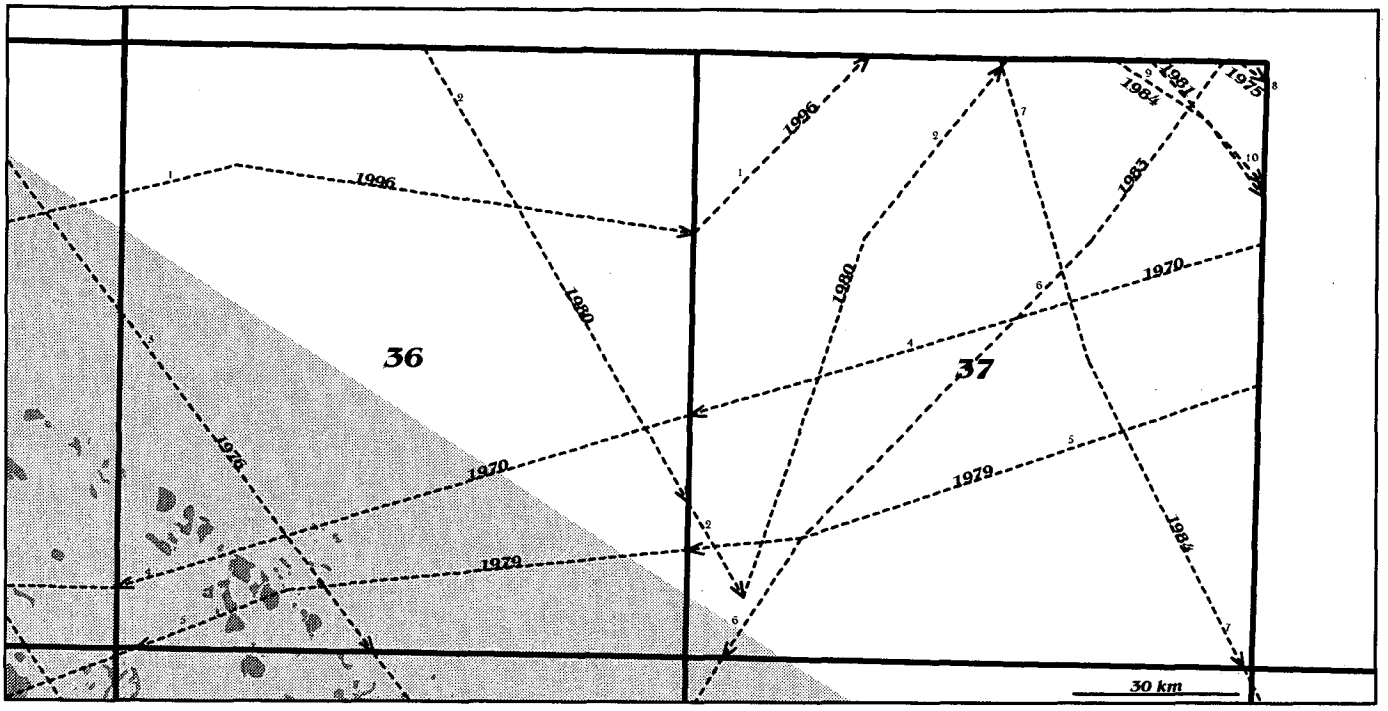
Map 113: *All cyclone paths passing between 19-20^{0}S and 146-148^{0}E from 1969-1997. The dashed lines show cyclone paths. The mainland and islands are shaded white, the GBR Region light gray and reefs dark gray.*



Map Boxes 34 and 35

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Aivu	1989	3-4 April	3	948 hPa
2	Vera	1974	18 January	0	997
3	Gertie	1971	15 February	2	983
4	Celeste	1996	26-27 January	3	965
5	Otto	1977	9 March	1	989
6	Pierre	1985	21 February	1	986
7	Watorea	1976	28 April	2	980
8	Ada	1970	17 January	3	963
9	Kerry	1979	4 March	1	995

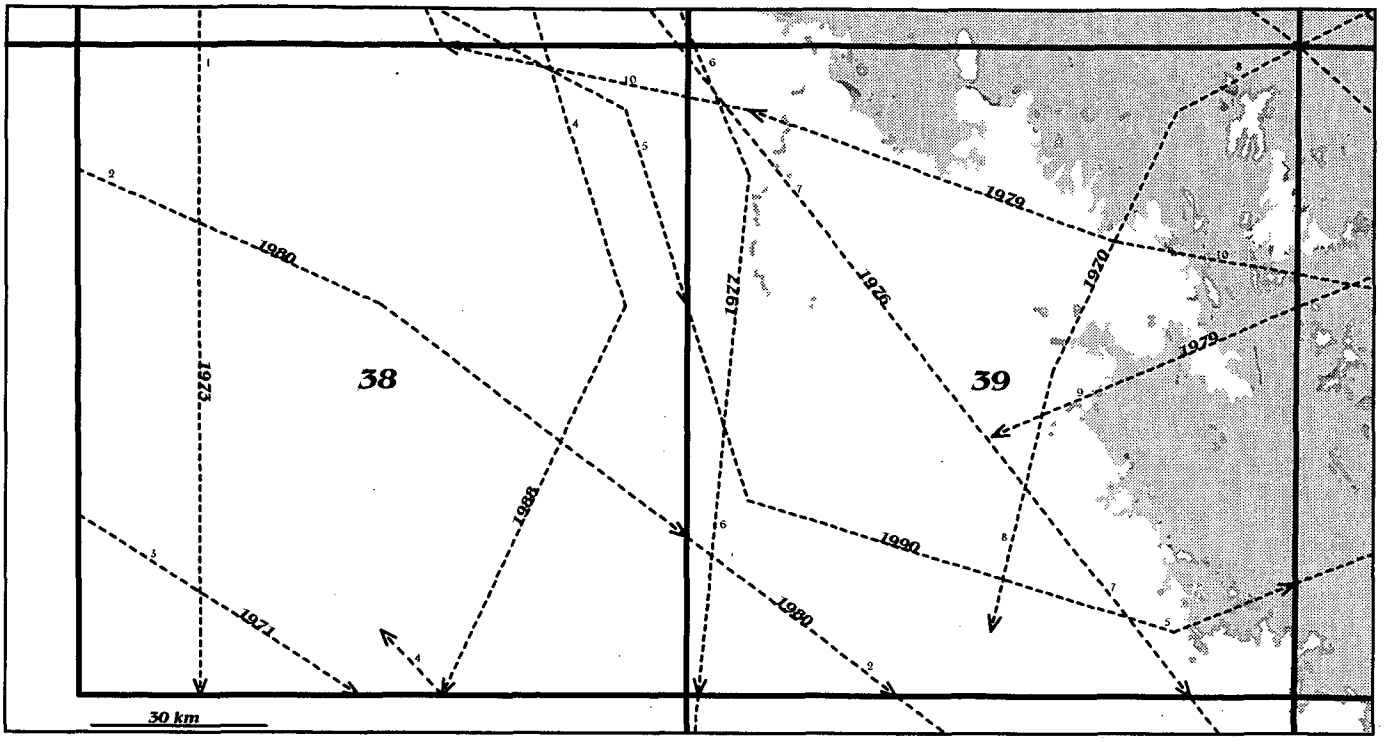
Map 114: *All cyclone paths passing between 19-20^0 S and 148-150^0 E from 1969-1997. The dashed lines show cyclone paths. The mainland and islands are shaded white, the GBR Region light gray and reefs dark gray.*



Map Boxes 36 and 37

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Celeste	1996	27-28 January	3	970 hPa
2	Ruth	1980	11 February	0	1003
3	Watorea	1976	28 April	2	980
4	Ada	1970	17 January	3	966
5	Gordon	1979	11 January	0	1001
6	Elinor	1983	3 January	2	980
7	Lance	1984	6 April	1	995
8	Gloria	1975	17 January	2	982
9	Grace	1984	15 January	2	975
10	Freda	1981	27 February	2	978

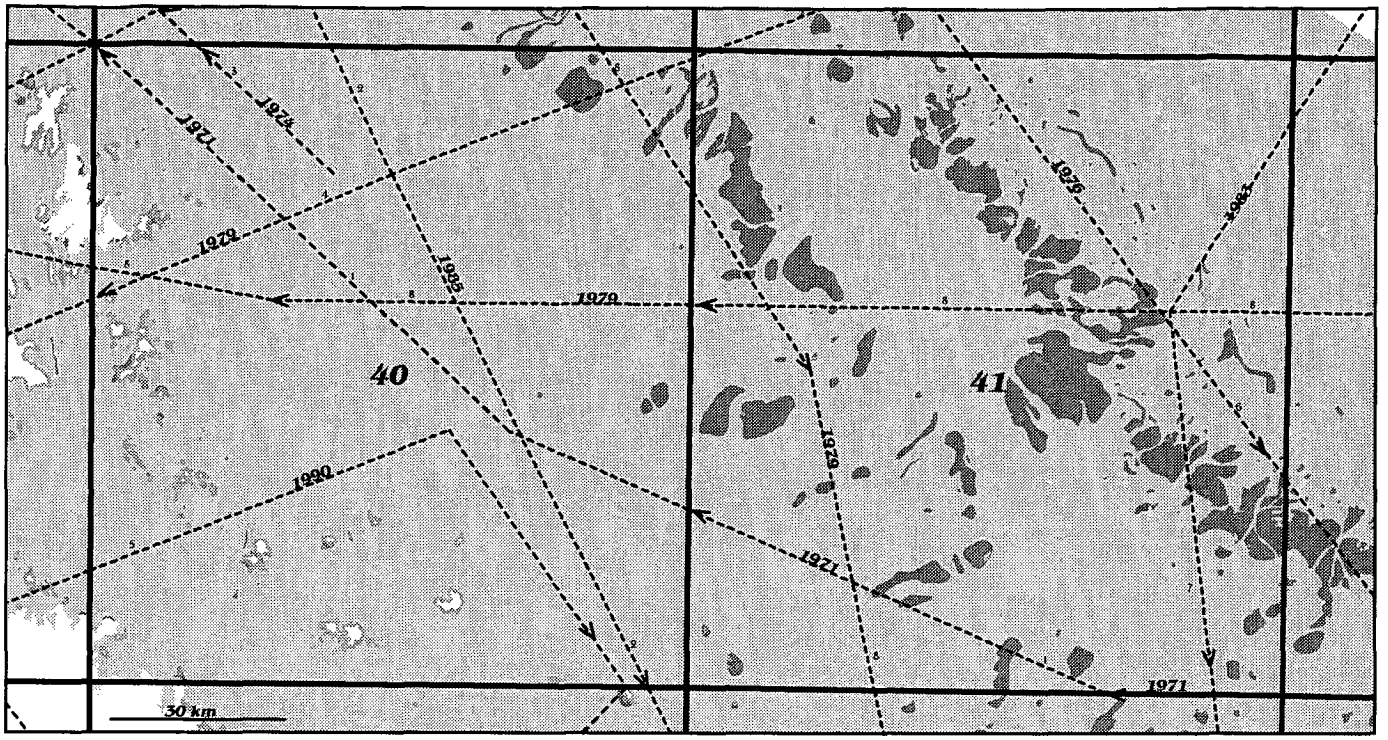
Map 115: *All cyclone paths passing between 19-20^{0}S and 150-152^{0}E from 1969-1997.*
The dashed lines show cyclone paths. The GBR Region is shaded light gray and reefs dark gray.



Map Boxes 38 and 39

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Una	1973	19 December	0	998 hPa
2	Paul	1980	6 January	1	995
3	Fiona	1971	20 February	1	994
4	Charlie	1988	1 March	0	993
5	Ivor	1990	24-25 March	0	1002
6	Otto	1977	9 March	1	989
7	Dawn	1976	5 March	1	995
8	Ada	1970	17-18 January	3	962
9	Gordon	1979	12 January	0	1001
10	Kerry	1979	1 March	1	992

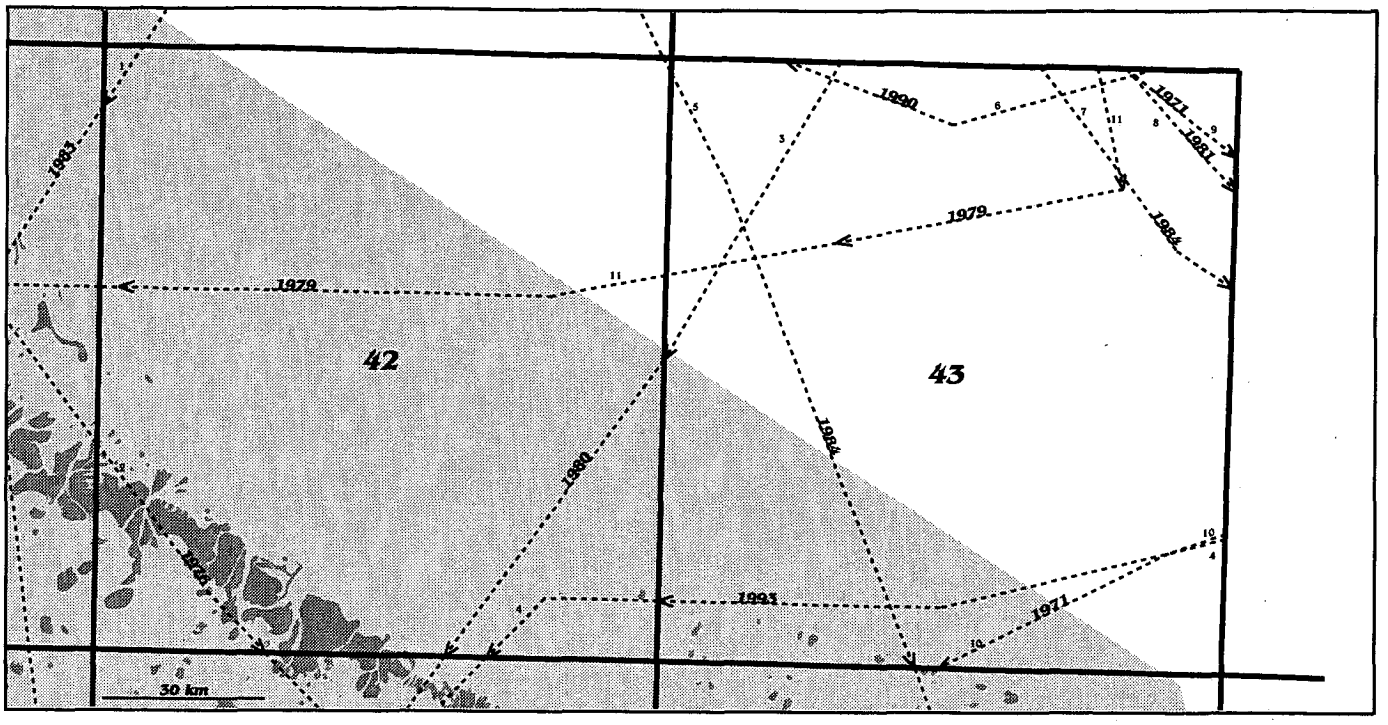
Map 116: *<u>All cyclone paths passing between 20-21^0 S and 147-149^0 E from 1969-1997</u>. The dashed lines show cyclone paths. The mainland and islands are shaded white, the GBR Region light gray and reefs dark gray.*



Map Boxes 40 and 41

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Gertie	1971	14-15 February	2	983 hPa
2	Pierre	1985	21 February	1	986
3	Vera	1974	18 January	0	1000
4	Gordon	1979	11 January	0	1001
5	Ivor	1990	25 March	0	1006
6	Watorea	1976	28 April	2	980
7	Elinor	1983	2 March	2	981
8	Kerry	1979	28 February 4 March	1	993

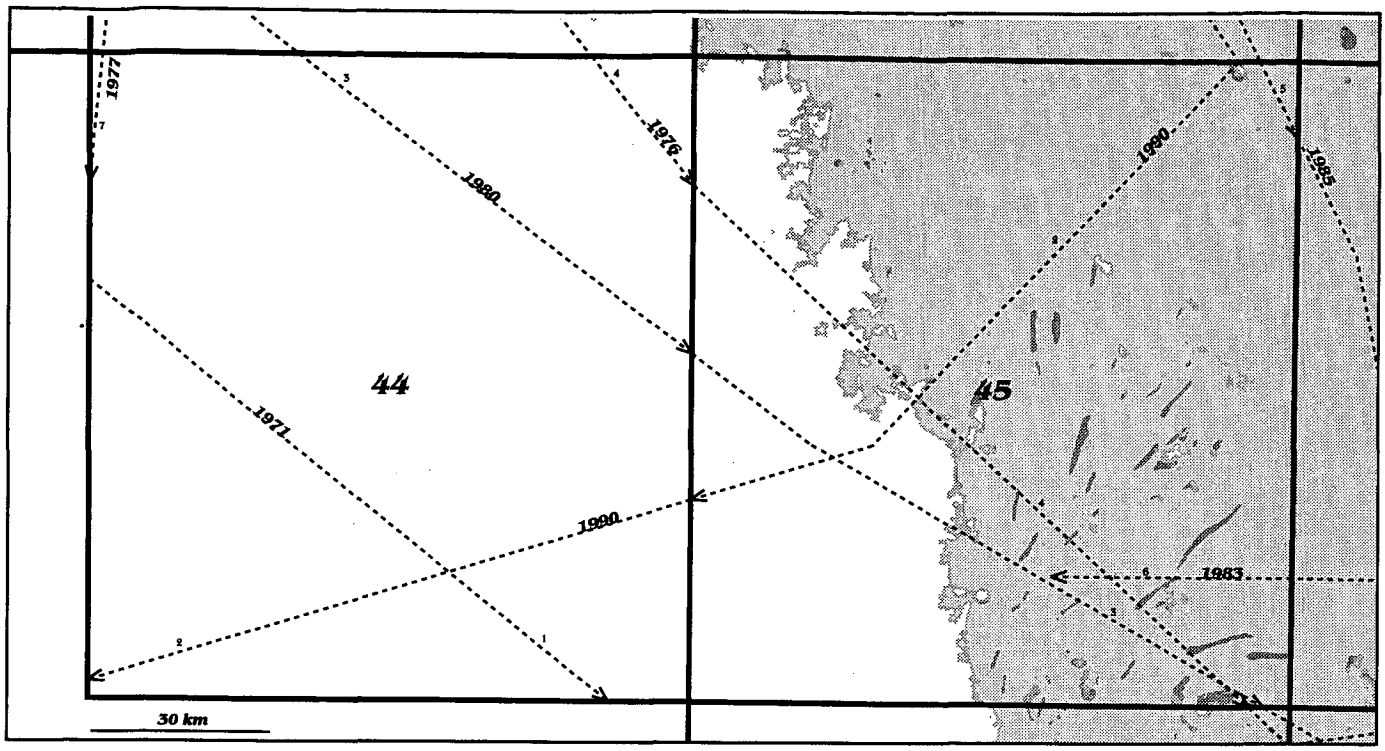
Map 117: *All cyclone paths passing between 20-21^{0}S and 149-151^{0}E from 1969-1997. The dashed lines show cyclone paths. The mainland and islands are shaded white, the GBR Region light gray and reefs dark gray.*



Map Boxes 42 and 43

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Elinor	1983	2 March	2	981 hPa
2	Watorea	1976	28 April	2	980
3	Simon	1980	23 February	2	980
4	Rewa	1993	18 January	3	965
5	Lance	1984	7 April	1	995
6	Hilda	1994	4 March	0	996
7	Grace	1984	16 January	2	975
8	Freda	1981	28 February	2	978
9	Dora	1971	10 February	0	998
10	Gertie	1971	14 February	2	983
11	Kerry	1979	27-28 February	1	994

Map 118: *All cyclone paths passing between 20-21^{0}S and 151-153^{0}E from 1969-1997.*
The dashed lines show cyclone paths. The GBR Region is shaded light gray and reefs dark gray.



Map Boxes 44 and 45

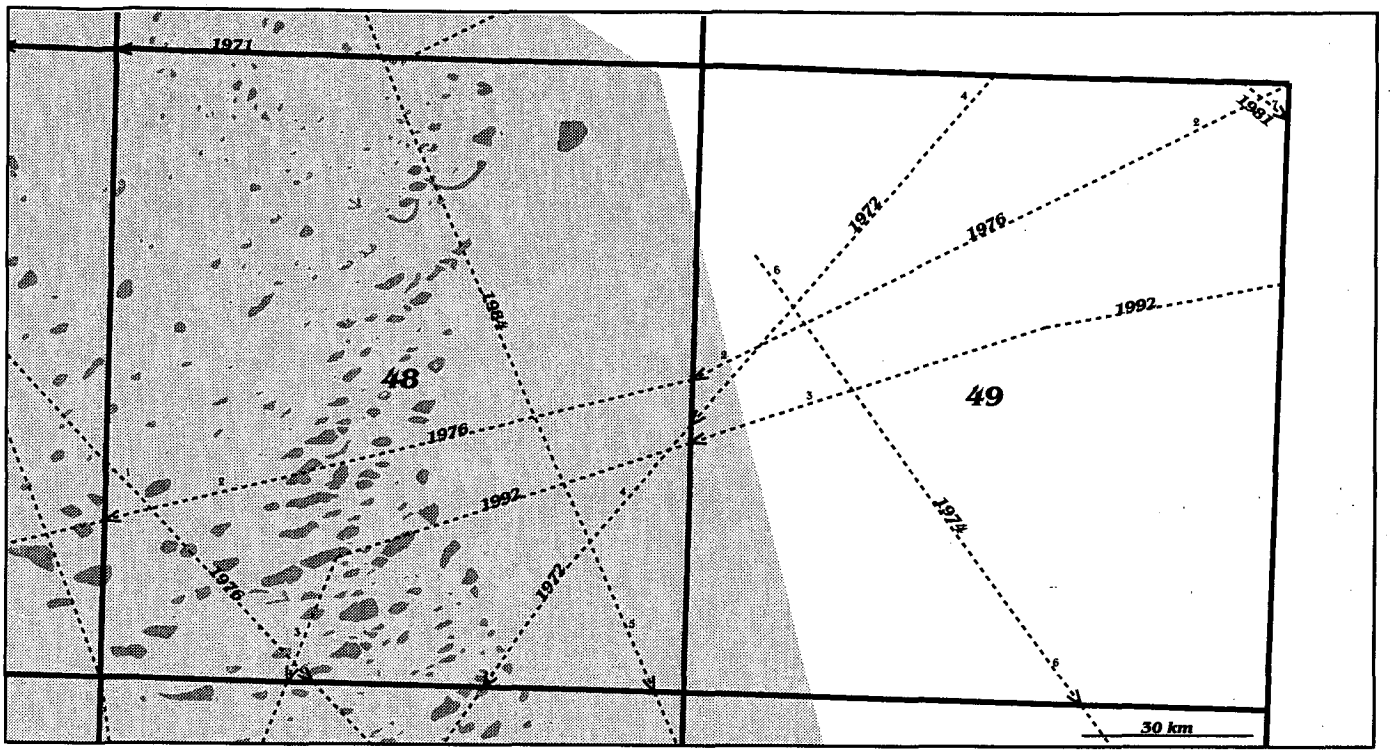
ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Fiona	1971	21 February	1	995 hPa
2	Ivor	1990	25-26 March	0	1006
3	Paul	1980	7 January	1	995
4	Dawn	1976	5 March	1	995
5	Pierre	1985	21 February	1	990
6	Elinor	1983	3 March	0	999
7	Otto	1977	9 March	1	990

Map 119: *All cyclone paths passing between 21-22^0 S and 148-150^0 E from 1969-1997. The dashed lines show cyclone paths. The mainland and islands are shaded white, the GBR Region light gray and reefs dark gray.*

Map Boxes 46 and 47

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Pierre	1985	21 February	1	990 hPa
2	Gertie	1971	14 February	2	983
3	Elinor	1983	2-3 March	2	980
4	David	1976	19 January	3	961
5	Simon	1980	23 February	3	970
6	Watorea	1976	28 April	2	980
7	Rewa	1993	19 January	2	975
8	Kerry	1979	5 March	1	995

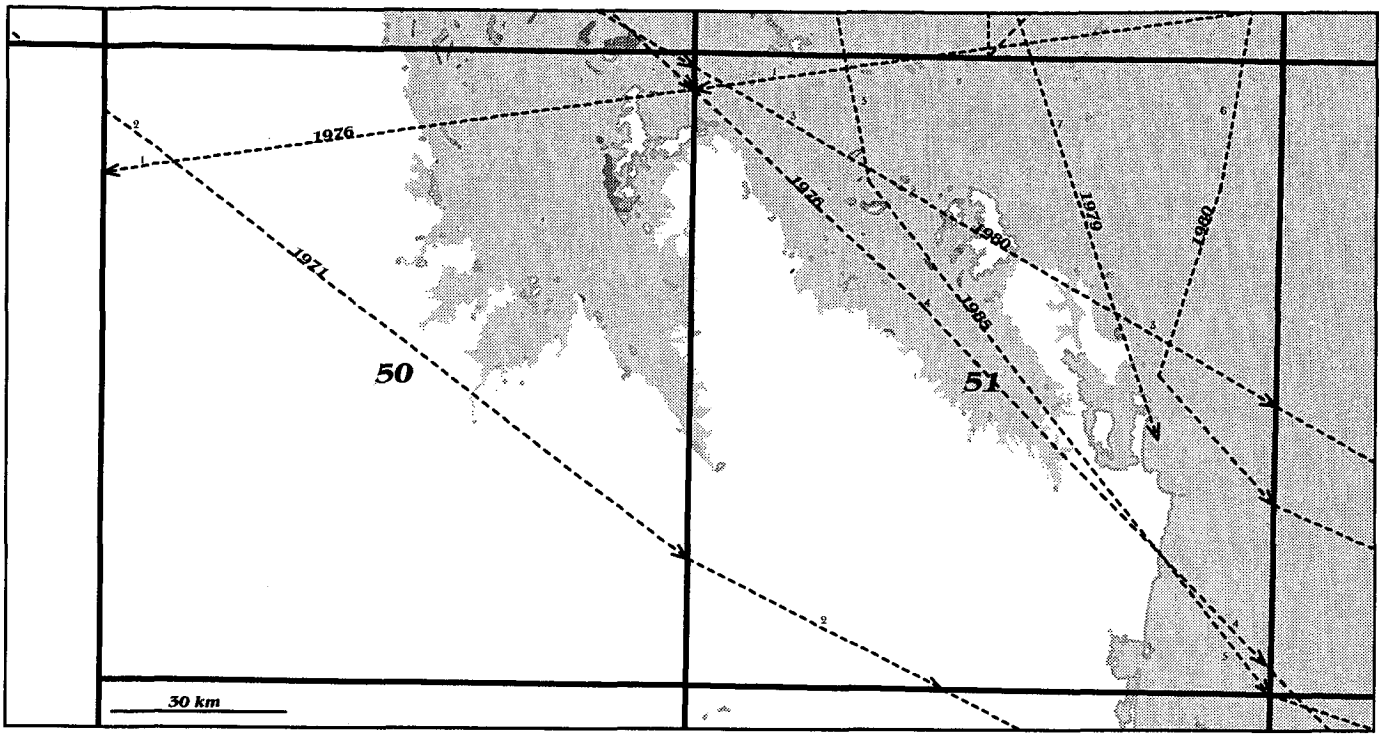
Map 120: *All cyclone paths passing between 21-22^{0}S and 150-152^{0}E from 1969-1997. The dashed lines show cyclone paths. The islands are shaded white, the GBR Region light gray and reefs dark gray.*



Map Boxes 48 and 49

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Watorea	1976	28 April	2	980 hPa
2	David	1976	19 January	3	965
3	Fran	1992	14-15 March	2	975
4	Emily	1972	1 April	3	961
5	Lance	1984	7 April	0	996
6	Alice	1974	21 March	0	1000
7	Freda	1981	28 February	2	974

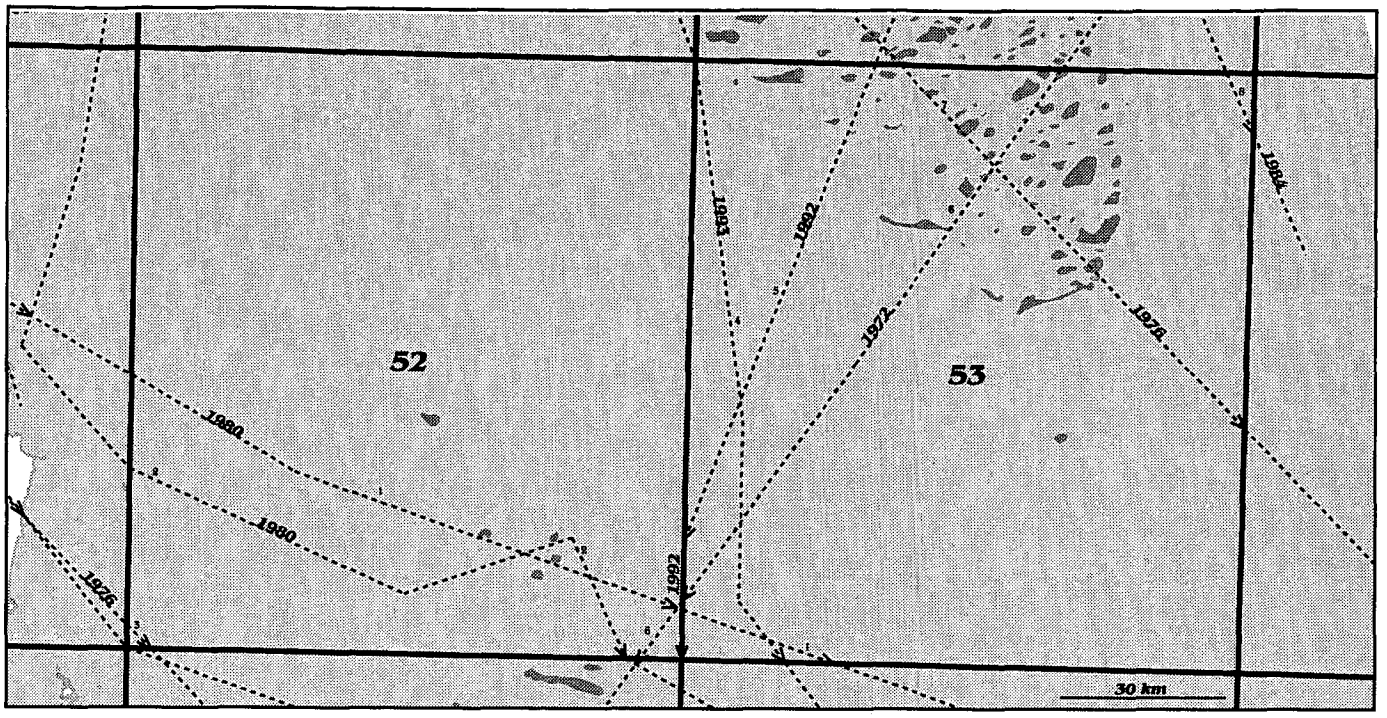
Map 121 : *All cyclone paths passing between 21-22^{0}S and 152-154^{0}E from 1969-1997.*
The dashed lines show cyclone paths. The GBR Region is shaded light gray and reefs dark gray.



Map Boxes 50 and 51

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	David	1976	19 January	3	961 hPa
2	Fiona	1971	21 February	1	995
3	Paul	1980	7 January	1	992
4	Dawn	1976	5 March	1	988
5	Pierre	1985	21-22 February	1	995
6	Simon	1980	23-24 February	3	950
7	Kerry	1979	5 March	0	998

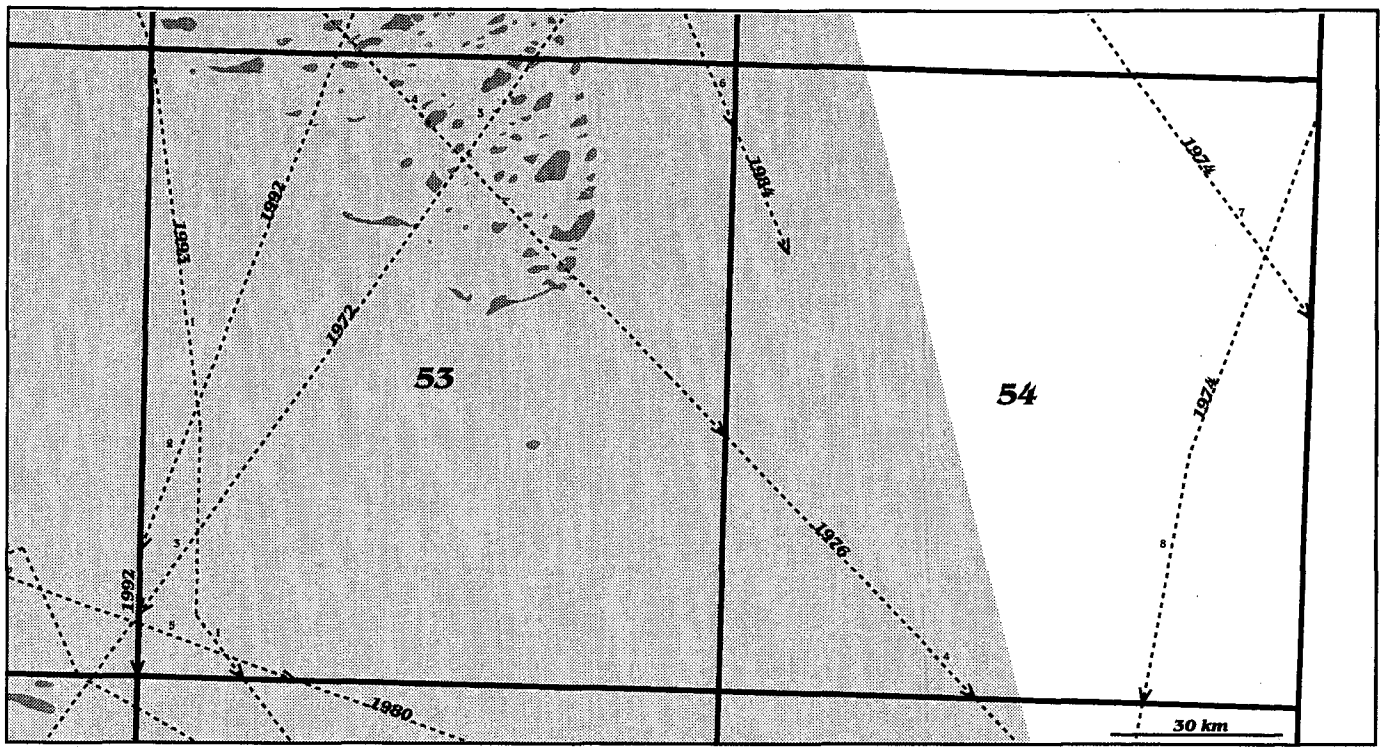
Map 122: *All cyclone paths passing between 22-23^{0}S and 149-151^{0}E from 1969-1997. The dashed lines show cyclone paths. The mainland and islands are shaded white, the GBR Region light gray and reefs dark gray.*



Map Boxes 52 and 53

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Paul	1980	7 January	1	992 hPa
2	Simon	1980	24 February	3	955
3	Dawn	1976	5 March	1	988
4	Rewa	1993	19 January	2	975
5	Fran	1992	15 March	2	985
6	Emily	1972	1 April	3	967
7	Watorea	1976	28 April	2	980
8	Lance	1984	7 April	0	998

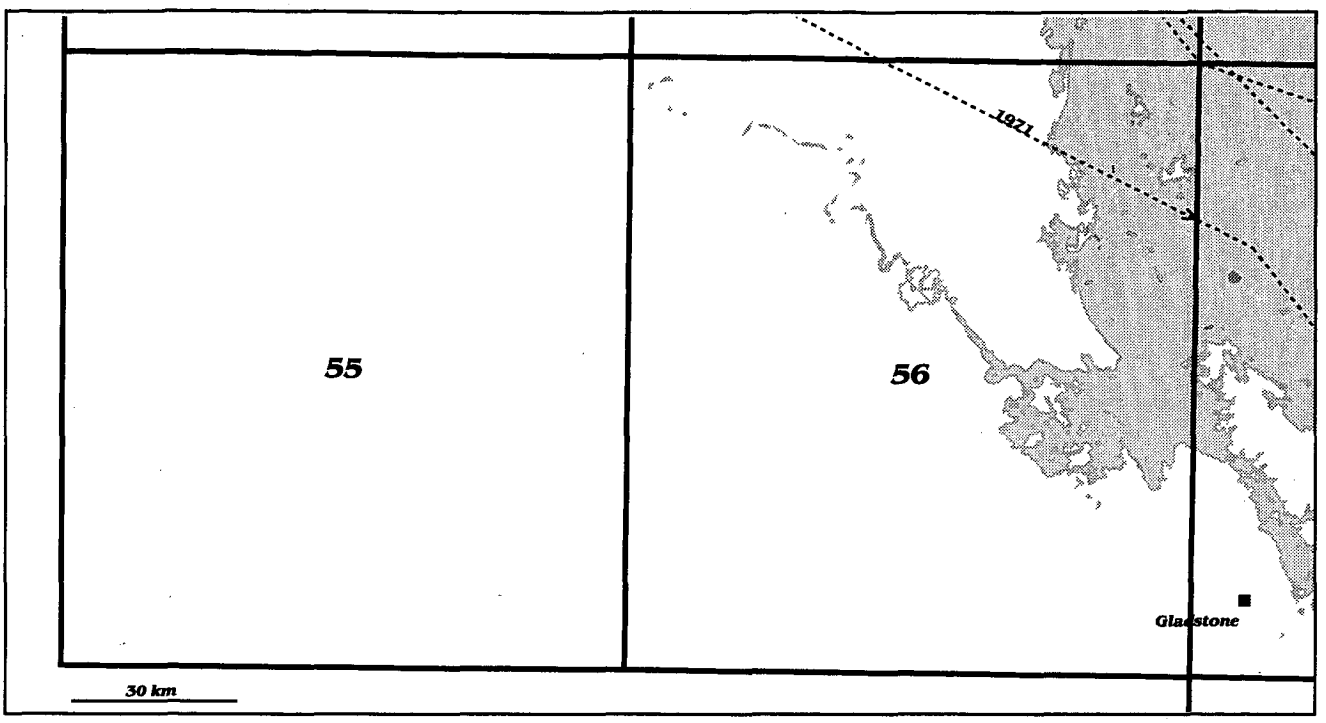
Map 123: *All cyclone paths passing between 22-23^0 S and 151-153^0 E from 1969-1997. The dashed lines show cyclone paths. The mainland and islands are shaded white, the GBR Region light gray and reefs dark gray.*



Map Boxes 53 and 54

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Rewa	1993	19 January	2	975 hPa
2	Fran	1992	15 March	2	985
3	Emily	1972	1 April	3	967
4	Watorea	1976	28 April	2	980
5	Paul	1980	7 January	1	992
6	Lance	1984	7 April	0	998
7	Alice	1974	21 March	0	1000
8	Wanda	1974	23 January	0	999

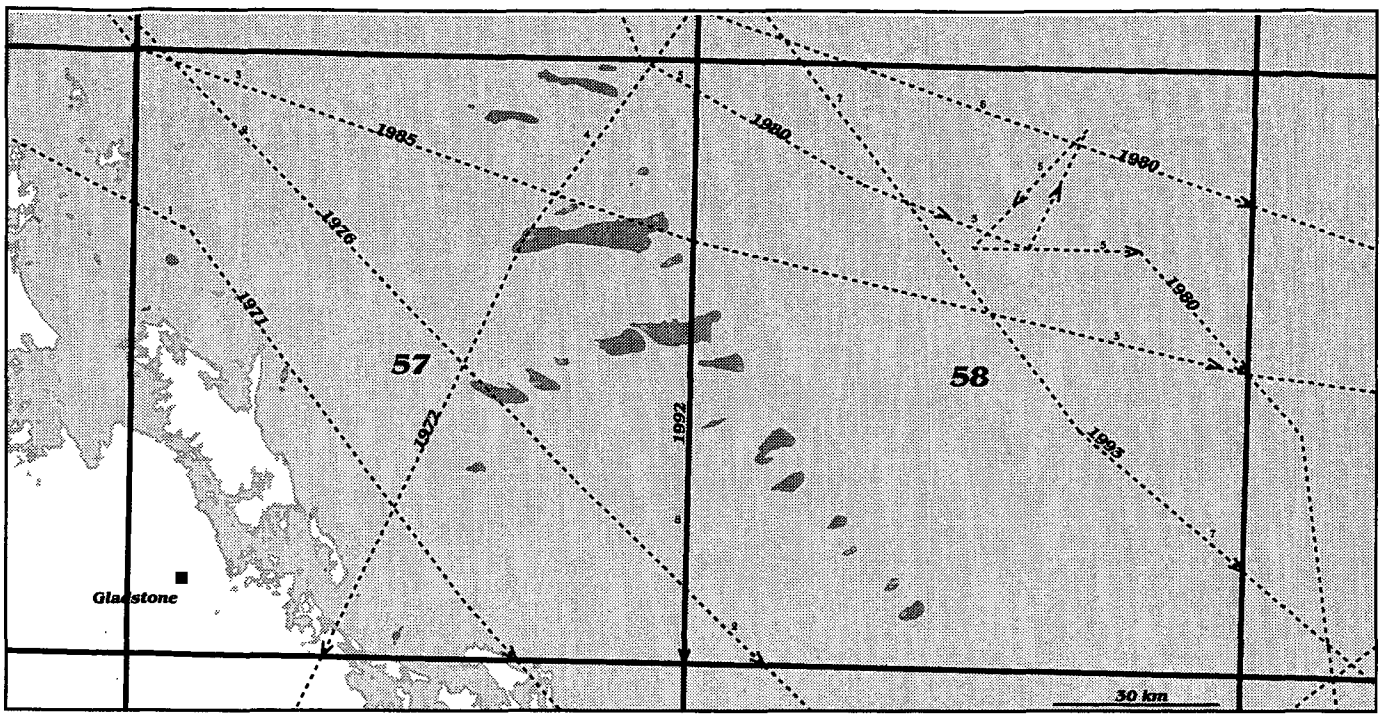
Map 124: *All cyclone paths passing between 22-23^0 S and 152-154^0 E from 1969-1997.*
The dashed lines show cyclone paths. The GBR Region is shaded light gray and reefs dark gray.



Map Boxes 55 and 56

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Fiona	1971	21 February	0	996 hPa

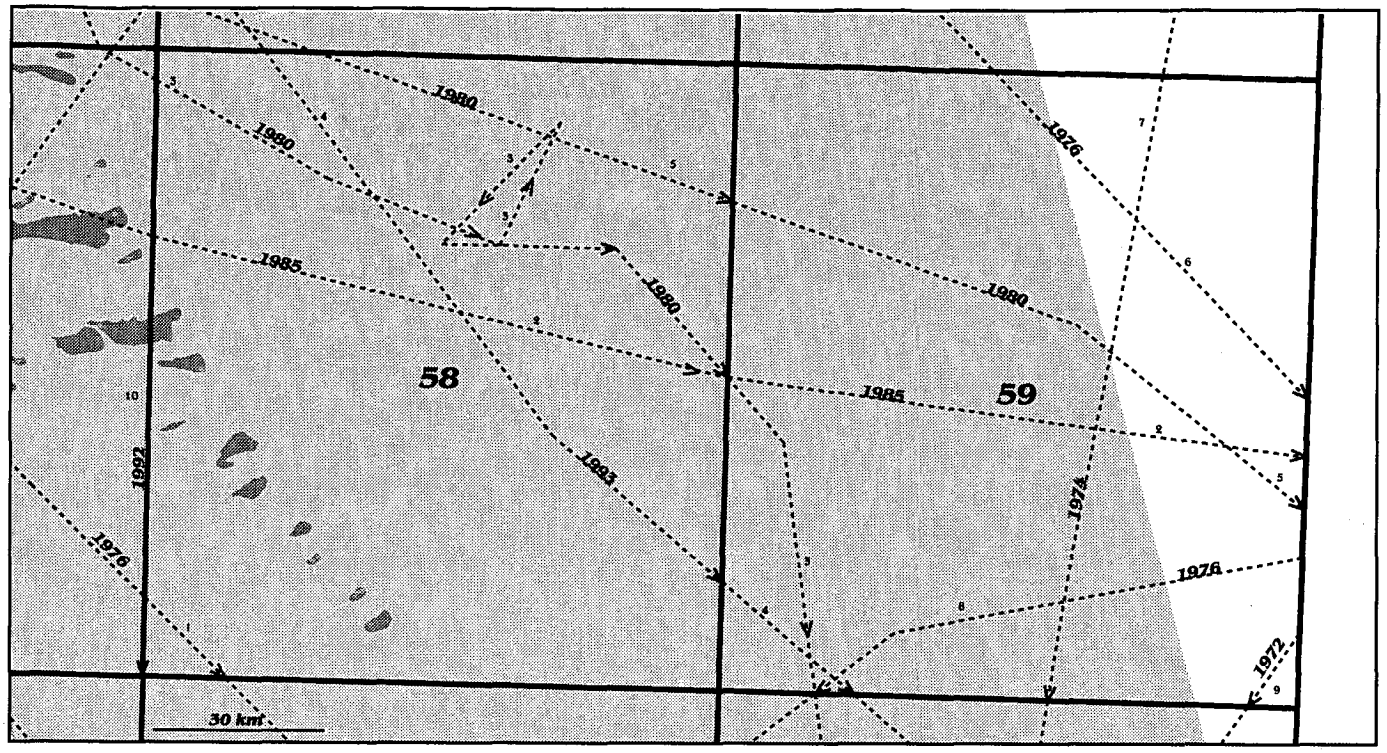
Map 125: *All cyclone paths passing between 23-24^0 S and 149-151^0 E from 1969-1997. The dashed lines show cyclone paths. The mainland and islands are shaded white, the GBR Region light gray and reefs dark gray.*



Map Boxes 57 and 58

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Fiona	1971	21 February	0	996 hPa
2	Dawn	1976	5 March	1	998
3	Pierre	1985	22 February	0	999
4	Emily	1972	2 April	2	974
5	Simon	1980	25-26 February	3	960
6	Paul	1980	7 January	1	992
7	Rewa	1993	20 January	2	980
8	Fran	1992	15 March	2	980

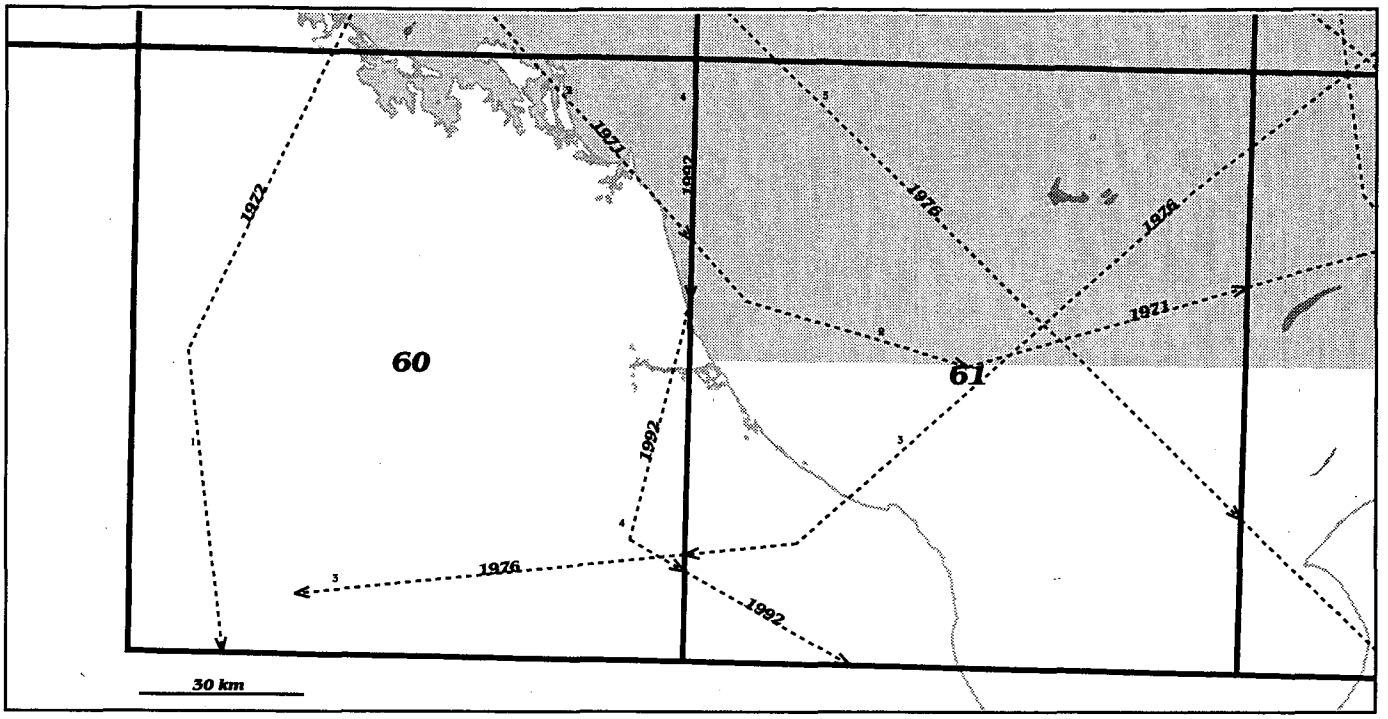
Map 126: *All cyclone paths passing between 23-24^{0}S and 151-153^{0}E from 1969-1997. The dashed lines show cyclone paths. The mainland and islands are shaded white, the GBR Region light gray and reefs dark gray.*



Map Boxes 58 and 59

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Dawn	1976	5 March	1	988 hPa
2	Pierre	1985	22 February	0	1000
3	Simon	1980	25-26 February	3	960
4	Rewa	1993	20 January	2	980
5	Paul	1980	7 January	1	993
6	Watorea	1974	28 April	2	980
7	Wanda	1974	24 January	0	1000
8	Beth	1976	21 February	1	993
9	Daisy	1972	10-11 February	3	960
10	Fran	1992	15 March	2	980

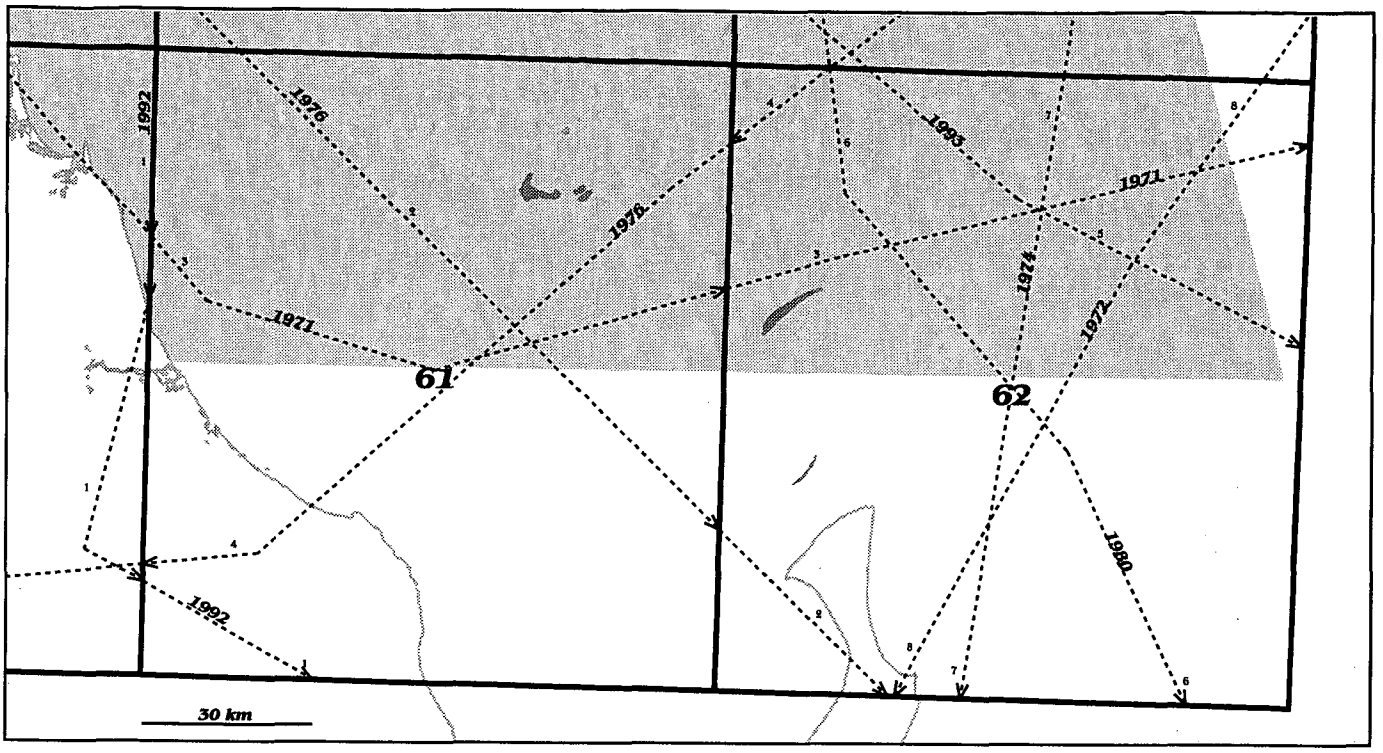
Map 127: *All cyclone paths passing between 23-24^0 S and 152-154^0 E from 1969-1997.*
The dashed lines show cyclone paths. The GBR Region is shaded light gray and reefs dark gray.



Map Boxes 60 and 61

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Emily	1972	2 April	1	993 hPa
2	Fiona	1971	22 February	1	994
3	Beth	1976	21-22 February	1	994
4	Fran	1992	15-16 March	2	980
5	Dawn	1976	5 March	1	988

Map 128: *All cyclone paths passing between 24-25^0 S and 151-153^0 E from 1969-1997. The dashed lines show cyclone paths. The mainland and islands are shaded white, the GBR Region light gray and reefs dark gray.*



Map Boxes 61 and 62

ID	*Name*	*Year*	*Dates*	*Maximum Category*	*Minimum Central Pressure*
1	Fran	1992	15-16 March	2	980 hPa
2	Dawn	1976	5 March	1	988
3	Fiona	1971	22 February	1	994
4	Beth	1976	21-22 February	1	994
5	Rewa	1993	20 January	2	980
6	Simon	1980	26-27 February	3	960
7	Wanda	1974	24 January	0	1000
8	Daisy	1972	11 February	3	963

Map 129: *All cyclone paths passing between 24-25^0 S and 152-154^0 E from 1969-1997. The dashed lines show cyclone paths. The mainland and islands are shaded white, the GBR Region light gray and reefs dark gray.*

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APPENDIX A:
LIST OF NAMED REEFS BY 1^0 LATITUDE / 1^0 LONGITUDE BOX

Listed below are all *named* reefs located within each 1^0 latitude / 1^0 longitude box (see Map 2). Also listed for each box is the range of unique reef identification numbers (from the GBRMPA reef gazette) covered. These unique reef ID's roughly correspond to each reef's latitude. Note that 1) a single reef may fall within more than one box, and 2) some boxes contain no reefs.

Box 1 *10300 - 10800*
Albany Island Reef A
Albany Island Reef B
Albany Island Reef C
Alpha Rock Reef
Ariel Bank
Brewis Island Reef
Four Fathom Patches
Harrington Reef
Harrington Shoal
Ida Island Reef
Mai Islet Reef
Meggi-Damun Reef
North Ledge Reef
Shortland Reef
South Brother Rock Reef
South Ledge Reef
Tern Island Reef
Turtle Head Island Reef A
Turtle Head Island Reef B
Turtle Island Reef
Wyborn Reef

Box 2 *10801 - 11063*
Aylings Reef
Basslet Reef
Linda Reef
Triangle Reef

Box 3 *10391 - 10428*
Triangle Reef

Box 5 *10801 - 11800*
Arnold Islet Reef
Bushy Island Reef
Cairncross Islets Reef
Douglas Islet Reef
Gilmore Bank
Halfway Islet Reef
Hannibal Islets Reef
Hunter Reefs
Macarthur Islands Reef
Niggerhead Reef
Pearn Rock Reef
Pirie Islet Reef

Box 6 *10419 - 12031*
Ashmore Banks
Bird Islands Reef
Boydong Island Reef
Bremner Shoal
Brierly Reef
Cape Grenville Reef A
Cape Grenville Reef B
Cape Grenville Reef C
Chimmo Shoal
Cholmondeley Islet Reef
Christmas Reef
Clerke Island Reef
Cockburn Patch
Cockburn Reef
Collette Reef
Douglas Islet Reef
Erlangen Patch
Five Reefs
Forty Winks Reef
Forwood Reef
Four Reef
Gore Island Reef
Great Detached Reef A
Great Detached Reef C
Great Detached Reef D
Guthray Reef
Harvey Island Reef
Hicks Island Reef
Jardine Islet Reef
Job Reef
Jukes Reef
Little Boydong Islet Reef
Maclennan Cay Reef
Magra Islet Reef
Mason Reef
McGillivray Reef
McSweeney Reef
Middle Banks Reef B

Middle Banks Reef C
Middle Banks Reef
Middle Reef
Milman/Aplin Islets Reef
Monsoon Reef
Nob Island Reef
Onslow Reef
Outer Reef
Paluma Shoal
Parsons Reef
Passage Reef
Perry Island Reef
Queue Reef
Rodney Island Reef
Sinclair Islet Reef
Sir Charles Hardy Islands Reef
South Bird Islands Reef
South Reef
Star Reef
Sunday Island Reef
Three Reefs
Thrush Reef
Turning Point Patches Reef
Twin Reefs
Viking Reef
Wallace Islet Reef
Wilds Shoal
Wizard Reef
Wreck Reef
Yule Detached Reef

Box 7 *10418 - 11245*
Great Detached Reef A
Great Detached Reef B
Great Detached Reef C
Great Detached Reef D
Pandora Reef
Raine Island Reef
Yule Detached Reef

Box 9 *11193 - 13001*
Allen Reef
Andrew Reef
Ape Reef
Bannan Reef
Beesley-Baird Islets Reef
Bligh Reef
Bunker Reef
Burke Reef
Cat Reef
Chapman Island Reef
Curd Reef
Daniell Reef
Dolphin Reef
Edward Shoals
Eel Reef
Exit Reef
Ferguson Reef
First Small Reef
Fison Reefs
Forbes Islands Reef
Frederick Patches
Gallon Reef
Haggerstone Island Reef
Hammond Reef
Hazel Reef
Hazelgrove Reefs
Henry Reef
Inset Reef
Kangaroo Shoals
Kay Reef
Kemp Rocks Reef
Lagoon Reef
Lansdown Reef
Laurel Reef
Lion Reef
Lloyd Islands Reef
Lloyds Reef
Log Reef
Long Sandy Reef
Mantis Reef
Martha Ridgway Reef A
Martha Ridgway Reef B
Mason Reef
May Reef
Middle Reef
Moody Reef
Nomad Reef
North Pint Patch
Northern Small Detached Reef
Pickard Reef
Pigeon Island Reef
Piper Reef
Quoin Island Reef
Restoration Island Reef
Restoration Rock Reef
Rocky Island Reef
Second Small Reef
Sherrard Island Reef
South Pint Patch
South Reef
Southern Small Detached Reef
Sunk Reef
Sunter Islet Reef

Tannadice Shoal
Twin Reefs
Tyrrel Reefs
Waight Bank
William Reef
William Reef
Wishbone Reef
Wye Reef
Young Reef
Zenith Reef

Box 12 *12143 - 14003*
Ballerina Shoal
Bell Bank
Binstead Island Reef
Blanchard Reef
Bow Reef
Burkitt Island Reef
Cat Reef
Celebration Reef
Colclough Reef
Dart Shoal
Derry Reef
Diamond Reign Reefs
Drake Shoals
Ellis Reef
Es Reef
Fife Island Reef
Franklin Reef
Frenchman Reef
Gertrude Reef
Glennie Reef
Grub Reef
Ham Reef
Hannah Island Reef
Hay Island Reef
Heath Reef
Hedge Reef
Hedge Reef
Iris Reef
Jubilee Reef
Kestrel Reef
Lowrie Island Reef
Lytton Reef
MacDonald Reef
Macnamara Patch
Magpie Reef
Morris Island Reef
New Reef
Night Island Reef
Noddy Reef A
Noddy Reef B
Noddy Reef C
North Kandalla Shoal
Obree Reef
Ogilvie Reef
Osborne Reef
Pelican Island Reef
Poulsen Rock
Quake Reef
Rattlesnake Reef A
Rattlesnake Reef B
Rattlesnake Reef C
Roskruge Reef
Sand Bank No. 7 Reef
Sand Bank No. 8 Reef
Sharland Reefs
South Kandalla Shoal
Stork Reef
Suchen Reef
Sullivan Shoal
Sykes Reef
Throne Shoals
Tijou Reef
Treat Reef
Wasp Reef
Waterwitch Reef
Wilkie Island Reef
Wilsen Shoal

Box 13 *13073 - 14034*
Corbett Reef
Creech Reef A
Creech Reef B
Davie Reef
Eves Reef
Grub Reef
Hedge Reef
Joan Reef
Rodda Reef
Sand Bank No 5 Reef
Scooterboot
Steene Reef
Tydeman Reef
Wilson Reef

Box 15 *14001 - 14022*
Beabey Patches
Cameron Shoal
Clark Shoal
Cliff Islands Reef
Eden Reef
Fahey Reef
Grub Reef

June Reef
Keast Shoal
Olive Patch
Taiwan Shoal
Wharton Reef

Box 16 *14003-14160*
Atkinson Reef
Aylen Patch
Baron Reef
Barrow Islands Reef
Beatrice Reef
Bewick Island Reef
Blackwood Island Reef
Boulder Rock Reef
Broomfield Rock Reef
Cape Rock Reef
Channel Rocks Reef
Clack Reef
Combe Reef
Coquet Island Reef
Corbett Reef
Corbett Reef
Davy Patches A
Davy Patches B
Davy Patches C
Denham Island Reef
Flinders Island Reef A
Flinders Island Reef B
Flinders Island Reef C
Flinders Rock
Grub Reef
Hales Island Reef
Hampton Island Reef
Houghton Island Reef
Howick Island Reef
Ingram & Beanley Islands Reef
King Island Reef
Leggatt Island Reef
Maclear Island Reef
Megaera Reef
Melanie Patches
Mid Reef
Miles Reef A
Miles Reef B
Munro Reef
Murdoch Island Reef
Newton Island Reef
Noble Island Reef
North Warden Reef
Oswald Shoal
Pipon Islands Reef
Pipon Shoal
Rocky Islets Reef A
Rocky Islets Reef B
Rocky Ledges Reef
Rocky Point Island Reef
Sand Bank No. 1 Reef
Sand Islet Reef
Scooterboot
Sinclair/Morris Island Reef
Singleton Shoal
South Warden Reef
Stanley Island Reef A
Stanley Island Reef B
Stanley Island Reef C
Stanley Island Reef D
Stanley Island Reef E
Stapleton Islet Reef
Switzer Reef
Unison Reef
Watson Island Reef
Wedge Rocks Reef
Weigall Reef A
Weigall Reef B
Wharton Reef
Wooden Patch

Box 17 *14073 - 14154*
Carter Reef
Covered Reef
Crescent Reef
Crompton Shoal
Day Reef
Decapolis Reef
Eye Reef
Eyrie Reef
Fly Reef
Gunga Shoal
Helsdon Reef
Hicks Reef
High Rock Reef
Hilder Reef
Jewell Reef
Kedge Reef
Linnet Reef
Lizard Island Coconut Bay Reef
Lizard Island Lagoon Reef
Lizard Island NE Side Reef
Lizard Island NW Side Reef
MacGillivray Reef
Martin Reef
Maxwell Reef

No Name Reef
North Direction Island Reef
Nymph Island Reef
Parke Reef
Pethebridge Islets Reef A
Pethebridge Islets Reef B
Petricola Shoal
Ribbon Reef No.10
Ribbon Reef No.9
Rocky Islets Reef A (northern)
Rocky Islets Reef B (northern)
Sim Reef
Snake Reef
South Direction Island Reef
Stewart Shoal
Turtle Group Reef A
Turtle Group Reef B
Turtle Group Reef C
Turtle Group Reef D
Turtle Group Reef E
Turtle Group Reef F
Turtle Group Reef G
Turtle Group Reef H
Turtle Group Reef I
Turtle Reef A
Turtle Reef B
Underwood Shoal
Waining Reef
Yonge Reef

Box 19 *14154 - 15099*
Ada Bank
Agincourt Reef No.4
Agincourt Reefs No.3
Andersen Reef
Bee Reef
Beor Reef
Blackbird Patches
Boulder Reef
Cairns Reef
Conical Rock Reef
Cowlishaw Reef
Dawson Reef
Delius Patch
Draper Patch
East Hope Island Reef
Egret Reef
Emily Reef
Endeavour Reef
Escape Reef
Evening Reef
Forrester Reef
Gill Patches
Gubbins Reef
Gull Reef
Harrier Reef
Irene Reef
Lake Reef
Lark Reef
Lena Reef
Long Reef
Low Wooded Island Reef
Mackay Reefs
Malcolm Patch
Marx Reef
Morning Reef
Murray Reef A
Murray Reef B
Murray Reef C
Osterland Reef
Ottaway Patch
Pasco Reef
Pearl Reef
Petty Patch
Pickersgill Reef
Pullen Reefs
Ribbon Reef No.1
Ribbon Reef No.2
Ribbon Reef No.2
Ribbon Reef No.2
Ribbon Reef No.3
Ribbon Reef No.4
Ribbon Reef No.5
Ribbon Reef No.6
Ribbon Reef No.7
Ribbon Reef No.8
Ribbon Reef No.9
Rocky Island Reef (middle)
Rosser Reef
Ruby Reef
Startle Reef
Stonor Patch
Strickland Reef
Swinger Reef
Three Isles Reef
Tilbrook Bank
Two Isles Reef
West Hope Island Reef
Williamson Reefs

Box 21 *15069 - 16082*
Agincourt Reef D
Agincourt Reef No.1
Agincourt Reef No.2

Agincourt Reefs No.3
Alexandra Reef
Arlington Reef
Batt Reef
Chinamen Reef
Double Island Reef
Egmont Reef
Fitzroy Island Reef
Garioch Reef
Green Island Reef
Hastings Reef
Haycock Island Reef
Korea Reef
Linden Bank
Little Fitzroy Island Reef
Low Isles Reef
Mackay Reef
Michaelmas Reef
Middle Cay Reef A
Morey Reef
Morning Reef
Norman Reef
Opal Reef
Oyster Reef
Pixie Reef
Rudder Reef
Satellite Reef
Saxon Reef
Snapper Island Reef
Spitfire Reef
St Crispin Reef
Tongue Reef
Undine Reef A
Undine Reef B
Unity Reef
Upolu Cay Reef
Vlasoff Reef
Wentworth Reef
Yule Reef

Box 22 *16030 - 17001*
Arlington Reef
Baines Patches
Briggs Reef
Channel Reef
Elford Reef
Euston Reef
Fin Reef
Flynn Reef
Green Island Reef
Hastings Reef
Hope Reef
Jenny Louise Shoal A
Jenny Louise Shoal B
Linden Bank
Little Fitzroy Island Reef
Michaelmas Reef
Milln Reef
Moore Reef
Nicholas Reef
Norman Reef
North West Reef
Onyx Reef
Outer Shoal
Pellowe Reef
Pretty Patches
Saxon Reef
Spur Reef
Sudbury Reef
Thetford Reef
Vlasoff Reef

Box 24 *17001 - 18018*
Adelaide Reef
Arthur Patches
Beaver Reef
Cayley Reef
Coates Reef
Dunk Island Reef
Eddy Reef
Ellison Reef
Farquarson Reef A
Farquarson Reef B
Feather Reef
Flora Reef
Gibson Reef
Gilbey Reef
Goudge Bank
Hall-Thompson Reef
Hedley Reef
Hervey Shoals A
Hervey Shoals B
Howie Reef
Jackson Patches
Jones Patch
King Reef
Lindquist Island Reef
Maori Reef
McCulloch Reef
Moss Reef
Mustard Patches A
Mustard Patches B
Nathan Reef
Noggin Reef

Noreaster Reef
Normanby Island Reef A
North Barnard Islands Reef
Otter Reef
Peart Reef
Potter Reef A
Potter Reef B
Potter Reef C
Publicans Shoals (North)
Publicans Shoals (South)
Raaf Shoals
Round Island Reef
Scott Reef
South Barnard Islands Reef
Stagg Patches A
Stagg Patches B
Stevens Reef
Sudbury Reef
Surprise Shoal
Taylor Reef
Thorpe Island Reef
Tobias Spit
Wardle Reef
Yamacutta Reef

Box 28 *17069 - 18066*
Acheron Island Reef
Barnett Patches
Bramble Reef
Brisk Islands Reef
Britomart Reef
Brook Islands Reef
Brook Shoal
Coombe Island Reef
Curacoa Island Reef A
Curacoa Island Reef B
Duncan Reef
Eclipse Island Reef
Esk Island Reef
Eva Island Reef
Fantome Island Reef
Fly Island Reef
Garden Island Reef
Goold Island Reef
Great Palm Island Reef A
Great Palm Island Reef B
Great Palm Island Reef C
Great Palm Island Reef D
Great Palm Island Reef E
Great Palm Island Reef F
Great Palm Island Reef G
Havannah Island Reef
Hudson Island Reef
Kelso Reef
Kennedy Shoal
Lady Elliot Reef
Little Kelso Reef
Orpheus Island Reef A
Orpheus Island Reef B
Orpheus Island Reef C
Orpheus Island Reef D
Orpheus Island Reef E
Otter Reef
Pandora Reef
Pelorus Island Reef
Rib Reef
Richards Island Reef
Smith Island Reef
Trunk Reef
Wheeler Island Reef

Box 29 *18030 - 18121*
Anzac Reef
Arab Reef
Arc Reef
Big Broadhurst Reef A
Big Broadhurst Reef B
Bowl Reef
Centipede Reef
Chicken Reef
Coil Reef
Cup Reef A
Cup Reef B
Davies Reef
Dip Reef
Faraday Reef
Fork Reef
Glow Reef
Grub Reef
Hall Reef A
Hall Reef B
Helix Reef
Hopkinson Reef
Hopkinson Shoal
John Brewer Reef
Keeper Reef
Kelso Reef
Knife Reef
Little Broadhurst Reef
Little Kelso Reef
Lodestone Reef
Lynchs Reef
Myrmidon Reef
Needle Reef

Pith Reef
Saucer Reef
Slashers No.1 Reef
Slashers No.2 Reef
Spoon Reef A
Spoon Reef B
Thimble Shoal
Thread Shoal
Urchin Shoal
Wheeler Reef
Yankee Reef

Box 30 *18107 - 19024*
Eagle Reef
Jaguar Reef
Jupiter Reef
Lion Reef
Prawn Reef
Shrimp Reef
Viper Reef

Box 32 *19002 - 19012*
Cockle Bay Reef
Herald Island Reef
Magnetic Island Reef B
Magnetic Island Reef C
Magnetic Island Reef D
Magnetic Island Reef E
Magnetic Island Reef F
Magnetic Island Reef G
Middle Reef
Paluma Shoals
Rattlesnake Island Reef
Virago Shoal

Box 33 *19013 - 19102*
Bowden Reef
Camp Islet Reef
Morinda Shoal
Pakhoi Bank
Salamander Reef
Tink Shoal
Wilson Shoal

Box 34 *19024 - 19113*
Castor Reef
Charity Reef
Cobham Reef A
Cobham Reef B
Croton Reef
Darley Reef
Dingo Reef A
Dingo Reef B
Dingo Reef C
Dingo Reef D
Dingo Reef E
Dingo Reef F
Fairey Reef A
Fairey Reef B
Fairey Reef C
Faith Reef
Gould Reef A
Gould Reef B
Gould Reef C
Gould Reef D
Gould Reef E
Holbourne Island Reef
Holbourne Island Reef
Hope Reef
Jacqueline Reef
Kangaroo Reef A
Kangaroo Reef B
Leopard Reef
Lynx Reef
Martin Reef
Mid Reef
Net Reef
Old Reef
Pollux Reef
Prawn Reef
Rattray Island Reef
Seagull Reef
Shell Reef
Showers Reef
Stanley Reef
Tiger Reef
Tobias Reef
Wallaby Reef

Box 35 *19069 - 19206*
Bait Reef
Black Reef East
Black Reef
Crab Reef
Elizabeth Reef
Ellen Reef
Eulalie Reef
Gargoyle Reef
Hardy Reef
Hewitt Reef
Hook Reef A
Hook Reef B
Hook Reef C
Joist Reef

Kennedy Reef
Knuckle Reef
Lath Reef
Line Reef
Little Reef
Napier Reef
Net Reef
Oublier Reef
Plaster Reef
Rafter Reef
Ross Reef
Round Reef
Seagull Reef
Sinker Reef
Stucco Reef
Tideway Reef A
Tideway Reef B
Tideway Reef C

Box 36 *19206 - 20113*
Abbott Reef
Ben Reef
Blossom Bank
Bond Reef
Ferris Shoal
Hyde Reef
James Reef
Marilyn Shoal
Maschke Shoal
Mc Intyre Reef
Oom Reef
Rebe Reef
Sharon Shoal A
Sharon Shoal B
Sharon Shoal C
Sharon Shoal D
Tompson Shoal
Wackett Reef
White Tip Reef
Williams Reef
Wyatt Earp Reef

Box 39 *20001 - 20409*
Alert Bank
Armit Islets Reef
Bennett Rock
Black Current Island Reef
Black Island Reef
Carpet Snake Island Reef
Cave Island Reef
Chyebassa Shoal
Cid Island Reef
Condor Shoal
Cow Island Reef
Croaker Rock Reef
Defiance Reefs
Defiance Reefs
Dent Island Reef
Double Cone Island Reef
Eshelby Island Reef
Fish Reef
Gloucester Island Reef
Gould Island Reef
Grassy Island Reef
Gumbrell Island Reef
Hamilton Island Reef A
Hamilton Island Reef B
Hayman Island Reef
Henning Island Reef
High Islands Reef A
High Islands Reef B
Hook Island Reef A
Hook Island Reef B
Hook Island Reef C
Hook Island Reef D
Hook Island Reef E
Hook Island Reef F
Hook Island Reef G
Hook Island Reef H
Hook Island Reef I
Langford and Bird Islands Reef
Long Island Reef A
Long Island Reef B
Long Island Reef C
Long Island Reef D
Long Island Reef E
Long Island Reef F
Long Shoal
Low Islet Reef
Low Rock Reef
Mausoleum Island Reef
Midge Island Reef
Newry Island Reef
North Head Reef
North Molle Island Reef
North Repulse Island Reef
Olden Island Reef
Pigeon Island Reef
Pigeon Islet Reef
Planton Island Reef
Rabbit Island Reef
Redcliffe Islands Reef
Repair Island Reef
Roseric Shoal

Ross Islet Reef
Saddleback Island Reef
Shute Island Reef
South Molle Island Reef
Stone Island Reef
Tancred Island Reef
Three Fathom Patch
U/N (Plum Pudding Island Reef)
West Molle Island Reef
Whitsunday Island Reef A
Whitsunday Island Reef B
Whitsunday Island Reef C
Whitsunday Island Reef H
Whitsunday Island Reef I
Whitsunday Island Reef J
Whitsunday Island Reef K
Whitsunday Island Reef L
Whitsunday Island Reef M
Whitsunday Island Reef N
Winter Shoal

Box 40 *19205 - 20407*
Baxendell Shoal
Bellows Island Reef
Blackcombe Island Reef
Bolton Shoal
Border Island Reef A
Border Island Reef B
Border Island Reef C
Brampton Island Reef
Bullion Rocks Reef
Carlisle Island Reef
Carondelet Rock Reef
Cashell Rock Reef
Chrome Rock Reef
Cockermouth Island Reef
Cole Island Reef
Comston Island Reef
Coppersmith Rock Reef
Credlin Reefs
Deloraine Island Reef
Dumbell Island Reef
Edgell Reefs
Fantome Rocks Reef
Filmoy Shoal
Forge Rocks Reef
Geranium Shoal
Goldsmith Island Reef A
Goldsmith Island Reef B
Goldsmith Island Reef C
Goldsmith Island Reef D
Green Island Reef
Harold Island Reef
Haslewood Island Reef A
Haslewood Island Reef B
Haslewood Island Reef C
Haslewood Island Reef D
Haslewood Island Reef E
Hyde Rock Reef
Ingot Islets Reef
Keswick Island Reef A
Keswick Island Reef B
Keswick Island Reef C
Keyser Island Reef
Leeper Shoal
Lindeman Island Reef A
Lindeman Island Reef B
Lindeman Island Reef C
Lindeman Island Reef D
Linne Island Reef A
Linne Island Reef B
Little Lindeman Island Reef
Locksmith Island Reef
Long Rock Reef
Lupton Island Reef
Parker Reef
Peta Patches
Seaforth Island Reef
Shaw Island Reef A
Shaw Island Reef B
Shaw Island Reef C
Shaw Island Reef D
Shaw Island Reef E
Shaw Island Reef F
Shaw Island Reef G
Shaw Island Reef H
Sidney Island Reef
Silloth Rocks Reef
Silversmith Island Reef
Specie Shoal
Square Reef
St. Bees Island Reef A
St. Bees Island Reef B
St. Bees Island Reef C
Thomas Island Reef
Tideway Reef A
Tideway Reef B
Tinsmith Island Reef
Volskow Island Reef
Wedge Island Reef
Wheatley Shoal
Whitsunday Island Reef C
Whitsunday Island Reef D
Whitsunday Island Reef E

Whitsunday Island Reef F
Whitsunday Island Reef G
Wigton Island Reef A
Wigton Island Reef B

Box 41 *20111 - 20402*
Bax Reef
Ben Reef
Big Stevens Reef
Boulton Reef
Briggs Reef
Bugatti Reef
Cannan Reef
Chauvel Reef A
Chauvel Reef B
Cockatoo Reef
Cockatoo Reef
Cole Reef A
Cole Reef B
Creal Reef
Gable Reef A
Gable Reef B
Hunt Reefs
Hunt Reefs
Liff Reefs
Little Bugatti Reef
Little Stevens Reef
McIntyre Reef
Molar Reef
Nixon Reef
Packer Reefs
Paterson Shoal
Pompey Reef
Redbill Island Reef
Robertson Reefs (1)
Robertson Reefs (2)
Robertson Reefs (3)
Robertson Reefs (4)
Sheriff Shoal
Southampton Reef
Tern Island Reef
Warland Reef
Wup Reef

Box 42 *20321 - 21142*
Cockatoo Reef
Cockatoo Reef

Box 43 *20393 - 21192*
-

Box 45 *21002 - 22003*
Alexandra Reef
Aquila Island Reef
Avoid Island Reef
Beaver Shoal
Beware Rocks Reef
Boomerang Shoal
Channel Islet Reef
Connor Islet Reef
Coral Point Reef
Cullen Islet Reef
Curlew Island Reef
Douglas Islet Reef
Downward Patches
Drumfish Shoal
Edwards Shoal
Escape Cay Reef
Ethel Sand Reef
Fairfax Rock Reef
Fanning Shoal
Ferdinand Shoal
Festing Shoal
Flat Top Island Reef
Freshwater Point Reef
George Island Reef
Glendaver Point Reef
Harry Shoal A
Harry Shoal B
Hay Reef
Holt Shoal
Kilgour Shoal
Lake Shoals
Lloyd Shoal
Middle Shoal
Morning Cay Reef
North Patch Reef
Oom Shoal
Park Shoal
Paxton Shoal
Pearl Shoal
Penrith Island Reef
Phillips Reef
Planter Shoal
Poynter Island Reef
Prudhoe Shoal
Race Rocks Reef
Red Clay Island Reef
Reef Islet Reef
Sandy Shoal A
Sandy Shoal B
Slattery Shoal
Smythe Shoals

Snake Cays Reef A
Snake Cays Reef B
South Patch Reef
Stony Shoal
Temple Island Reef
Temple Islets Reef
Tinonee Bank
Tinonee Peak Island Reef
Torch Shoal
Tupper Shoal
Turn Island Reef
Victor Islet Reef
Viscount Shoal A
Viscount Shoal B
Viscount Shoal C
Waratah Shoal
West Hill Island Reef
West Reef
Wild Duck Island Reef
Williams Shoal
Yaralla Shoal

Box 46 *20351 - 21593*
Alarm Reef
Bamborough Island Reef A
Bamborough Island Reef B
East Spur Reef
Howard Islet Reef
Hunter Island Reef A
Hunter Island Reef B
Iron Islet Reef
Marble Island Reef
Middle Island Reef
North East Island Reef
Owens Shoal
Pine Islets Reef
Pine Peak Island Reef
Prince Reef
Sandpiper Reef
South East Islets Reef
South Island Reef A
South Island Reef B
Tynemouth Island Reef A
Tynemouth Island Reef B
West Spur Reef
Whites Bay Reef

Box 47 *20388 - 21592*
Adroit Shoal
Bell Cay Reef
Herald Reef Prong
Heralds Prong No.2 Reef
Heralds Prong No.3 Reef
Lavers Cay Reef
Riptide Cay Reef
Storm Cay Reef
Twin Cays Reef

Box 48 *20400 - 22103*
Banana Cay
Beacon Reef
Bills Reef
Blu-Lion Reef
Centenery Cay Reef
Central Reef
Chinaman Reef
Detour Reef
East Cay Reef
Elusive Reef
Emperor Reef
Foller Reef
Frigate Cay Reef
Gannett Cay Reef
Half Moon Reef
Half Tide Reef
Heart Reef
Hill Reef
Houdini Reef
Jenkins Reef
Lavers Cay Reef
Little Banana Reef
Littles Reef
Long Reef
Mervs Reef
Mystery Cay Reef
Obstruction Reef
Pike Reef
Price Cay Reef
Recreation Cay Reef
Small Lagoon Reef
Small Reef
Triangle Reef
Turner Cay Reef
Turrum Cay Reef
Turtle Reef
Twin Cay Reef
Wade Reef
Zodiac Cay Reef

Box 50 *21380 - 22028*
Barren Islet Reef
Boyle Reef
Brooks Shoal
Coal Island Reef

Escape Cay Reef
Gull Cay Reef
Infelix Islets Reef
Long Island Reef
McEwen Island Reef
North Point Cays Reef
Obstruction Shoal
One Fathom Patch Reef
Park Shoal
Pilot Reef
Roundish Island Reef
Snake Cays Reef A
Snake Cays Reef B
South Barren Islet Reef
Tide Island Reef
Tornado Rocks Reef A
Tornado Rocks Reef B
Turtle Island Reef
West Side Island Reef
Wild Duck Island Reef

Box 51 *21423 - 22167*
Blind Rock Reef
Clara Group Reef
Collins Island Reef
Connor Rock Reef
Danger Island Reef
Donovan Shoal
Earl Banks
Harrison Islet Reef
Holt Island Reef
Iron Islet Reef
Leicester Island Reef
Lingham Island Reef
Marquis Island Reef
Mumford Island Reef
Osborn Island Reef
Otterbourne Island Reef
Pelican Rock Reef
Ripple Islets Reef
Rothbury Island Reef
Round Rock Reef
Shields Island Reef
Ten Pin Rock Reef
Triangular Island Reef
Turn Shoal
Tynemouth Island Reef B
White Shoal

Box 52 *22156 - 22160*
Barcoo Bank
Edgell Bank
Goodwin Shoal
Karamea Bank
Moresby Bank

Box 53 *22084 - 22161*
Abrahams Reef
Archer Shoal
Chesterman Reef
Chinaman Reef
Dicks Reef
Gater Reef
Hackie Reef
Half Moon Reef
Herald No.1 Reef
Hixson Cay Reef
Hook Reef
Horseshoe Reef
Howard Patch Reef
Junior Reef
Sanctuary Reef
Sandshoe Reef
Sinker Reef
South Hixson Cay Reef
Sunray Reef
Sweetlip Reef
Taiwan Reef
Twins Reef
Wilson Reef

Box 56 *23001 - 23083*
Conical Rocks Reef
Corroboree Island Reef
Creek Rock Reef
Divided Island Reef
Girt Island Reef
Great Keppel Island Reef A
Great Keppel Island Reef B
Great Keppel Island Reef C
Great Keppel Island Reef D
Great Keppel Island Reef E
Halfway Island Reef
Humpy Island Reef
Man & Wife Rocks Reef
Miall Island Reef
Middle Island Reef
Mother Macgregor Island Reef
North Keppel Island Reef A
North Keppel Island Reef B
Outer Rock Reef
Peak Island Reef
Pelican Island Reef
Pumpkin Island Reef

Round Rock Reef
Square Rocks Reef
Sykes Rock Reef
Wedge Island Reef

Box 57 *23031 - 24003*
Barren Island Reef
Bass Shoals
Brew Shoal
Broomfield Reef
Bushy Islet Reef
Curtis Island Reef A
Curtis Island Reef B
Curtis Island Reef C
Curtis Island Reef D
Curtis Rock Reef
Douglas Shoal
East Bank
Egg Rock Reef
Erskine Island Reef
Facing Is. Reef (North Point)
Facing Is. Reef (Pearl Ledge)
Facing Is. Rf(East Pt. Ledge)
Facing Island Reef B
Facing Island Reef D
Facing Island Reef F
Farmers Reef
Guthrie Shoal
Haberfield Shoal
Heron Island Reef
Innamincka Shoal
Irving Reef
Jabiru Shoals
Johnson Patch
Lisa Jane Shoals
Manning Reef
Masthead Island Reef
North Reef A
North Reef B
North West Island Reef
Polmaise Reef
Rat Island Reef
Rock Cod Shoal
Rundle Island Reef
Sable Chief Rocks Reef
Seal Rocks Reef A
Seal Rocks Reef B
Seal Rocks Reef C
Timandra Bank
Tryon Island Reef
Turtle Island Reef
Wilson Island Reef
Wistari Reef
Wreck Island Reef

Box 58 *23052 - 23082*
oult Reef
Fairfax Islands Reef
Fitzroy Reef
Heron Island Reef
Hoskyn Islands Reef
Lady Musgrave Island Reef
Lamont Reef
Llwellyn Reef
One Tree Island Reef
Sykes Reef

Box 60 *24003 - 24006*
Red Rocks Reef

Box 61 *24008 - 24009*
Herald Patches A
Herald Patches B
Herald Patches C
Lady Elliot Island Reef

Box 62 *24010 - 24011*

APPENDIX B:
LIST OF NAMED REEFS - ALPHABETICAL ORDER

Listed below are all *named* reefs in the GBR in alphabetical order and the 1^0 latitude / 1^0 longitude box within which each reef is located (see Map 2). Where different reefs have the same name, each reef's unique identification number is provided. Note that some reefs are located within more than one box.

REEF NAME	*BOX*
Abbott Reef	36
Abrahams Reef	53
Acheron Island Reef	28
Ada Bank	19
Adelaide Reef	24
Adroit Shoal	47
Agincourt Reef D	21
Agincourt Reef No.1	21
Agincourt Reef No.2	21
Agincourt Reef No.4	19
Agincourt Reefs No.3	19, 21
Alarm Reef	46
Albany Island Reef A	1
Albany Island Reef B	1
Albany Island Reef C	1
Alert Bank	39
Alexandra Reef	21, 45
Allen Reef	9
Alpha Rock Reef	1
Andersen Reef	19
Andrew Reef	9
Anzac Reef	29
Ape Reef	9
Aquila Island Reef	45
Arab Reef	29
Arc Reef	29
Archer Shoal	53
Ariel Bank	1
Arlington Reef	21, 22
Armit Islets Reef	39
Arnold Islet Reef	5
Arthur Patches	24
Ashmore Banks (11233)	6
Ashmore Banks (11234)	6
Ashmore Banks (11237	6
Atkinson Reef	16
Avoid Island Reef	45
Aylen Patch	16
Aylings Reef	2
Baines Patches	22
Bait Reef	35

REEF NAME	*BOX*
Ballerina Shoal	12
Bamborough Island Reef A	46
Bamborough Island Reef B	46
Banana Cay	48
Bannan Reef	9
Barcoo Bank	52
Barnett Patches	28
Baron Reef	16
Barren Island Reef	57
Barren Islet Reef	50
Barrow Islands Reef	16
Bass Shoals	57
Basslet Reef	2
Batt Reef	21
Bax Reef	41
Baxendell Shoal	40
Beabey Patches	15
Beacon Reef	48
Beatrice Reef	16
Beaver Reef	24
Beaver Shoal	45
Bee Reef	19
Beesley-Baird Islets Reef	9
Bell Bank	12
Bell Bank	12
Bell Cay Reef	47
Bellows Island Reef	40
Ben Reef	36, 41
Bennett Rock	39
Beor Reef	19
Beware Rocks Reef	45
Bewick Island Reef	16
Big Broadhurst Reef A	29
Big Broadhurst Reef B	29
Big Stevens Reef	41
Bills Reef	48
Binstead Island Reef	12
Bird Islands Reef	6
Black Current Island Reef	39
Black Island Reef	39
Black Reef East	35

REEF NAME	*BOX*
Black Reef	35
Blackbird Patches	19
Blackcombe Island Reef	40
Blackwood Island Reef	16
Blanchard Reef	12
Bligh Reef	9
Blind Rock Reef	51
Blossom Bank	36
Blu-Lion Reef	48
Bolton Shoal	40
Bond Reef	36
Boomerang Shoal	45
Border Island Reef A	40
Border Island Reef B	40
Border Island Reef C	40
Boulder Reef	19
Boulder Rock Reef	16
Boult Reef	58
Boulton Reef	41
Bow Reef	12
Bowden Reef	33
Bowl Reef	29
Boydong Island Reef	6
Boyle Reef	50
Bramble Reef	28
Brampton Island Reef	40
Bremner Shoal	6
Brew Shoal	57
Brewis Island Reef	1
Brierly Reef	6
Biggs Reef (16074)	22
Briggs Reef (20299)	41
Brisk Islands Reef	28
Britomart Reef	28
Brook Islands Reef	28
Brook Shoal	28
Brooks Shoal	50
Broomfield Reef	57
Broomfield Rock Reef	16
Bugatti Reef	41
Bullion Rocks Reef	40
Bunker Reef	9
Burke Reef	9
Burkitt Island Reef	12
Bushy Island Reef	5
Bushy Islet Reef	57
Cairncross Islets Reef	5
Cairns Reef	19
Cameron Shoal	15
Camp Islet Reef	33
Cannan Reef	41

REEF NAME	*BOX*
Cape Grenville Reef A	6
Cape Grenville Reef B	6
Cape Grenville Reef C	6
Cape Rock Reef	16
Carlisle Island Reef	40
Carondelet Rock Reef	40
Carpet Snake Island Reef	39
Carter Reef	17
Cashell Rock Reef	40
Castor Reef	34
Cat Reef	9, 12
Cave Island Reef	39
Cayley Reef	24
Celebration Reef	12
Centenery Cay Reef	48
Centipede Reef	29
Central Reef	48
Channel Islet Reef	45
Channel Reef	22
Channel Rocks Reef	16
Chapman Island Reef	9
Charity Reef	34
Chauvel Reef A	41
Chauvel Reef B	41
Chesterman Reef	53
Chicken Reef	29
Chimmo Shoal	6
Chinaman Reef	48, 53
Chinamen Reef (16024)	21
Cholmondeley Islet Reef	6
Christmas Reef	6
Chrome Rock Reef	40
Chyebassa Shoal	39
Cid Island Reef	39
Clack Reef	16
Clara Group Reef	51
Clark Shoal	15
Clerke Island Reef	6
Cliff Islands Reef	15
Cliff Islands Reef	15
Coal Island Reef	50
Coates Reef	24
Cobham Reef A	34
Cobham Reef B	34
Cockatoo Reef	41, 42
Cockburn Patch	6
Cockburn Reef	6
Cockermouth Island Reef	40
Cockle Bay Reef	32
Coil Reef	29
Colclough Reef	12

REEF NAME	*BOX*
Cole Island Reef	40
Cole Reef A	41
Cole Reef B	41
Collette Reef	6
Collins Island Reef	51
Combe Reef	16
Comston Island Reef	40
Condor Shoal	39
Conical Rock Reef	19
Conical Rocks Reef	56
Connor Islet Reef	45
Connor Rock Reef	51
Coombe Island Reef	28
Coppersmith Rock Reef	40
Coquet Island Reef	16
Coral Point Reef	45
Corbett Reef	13, 16
Corroboree Island Reef	56
Covered Reef	17
Cow Island Reef	39
Cowlishaw Reef	19
Crab Reef	35
Creal Reef	41
Credlin Reefs (20287)	40
Credlin Reefs (20288)	40
Creech Reef A	13
Creech Reef B	13
Creek Rock Reef	56
Crescent Reef	17
Croaker Rock Reef	39
Crompton Shoal	17
Croton Reef	34
Cullen Islet Reef	45
Cup Reef A	29
Cup Reef B	29
Curacoa Island Reef A	28
Curacoa Island Reef B	28
Curd Reef	9
Curlew Island Reef	45
Curtis Island Reef A	57
Curtis Island Reef B	57
Curtis Island Reef C	57
Curtis Island Reef D	57
Curtis Rock Reef	57
Danger Island Reef	51
Daniell Reef	9
Darley Reef	34
Dart Shoal	12
Davie Reef	13
Davies Reef	29
Davy Patches A	16
Davy Patches B	16
Davy Patches C	16
Dawson Reef	19
Day Reef	17
Decapolis Reef	17
Defiance Reefs	39
Delius Patch	19
Deloraine Island Reef	40
Denham Island Reef	16
Dent Island Reef	39
Derry Reef	12
Detour Reef	48
Diamond Reign Reefs	12
Dicks Reef	53
Dingo Reef A	34
Dingo Reef B	34
Dingo Reef C	34
Dingo Reef D	34
Dingo Reef E	34
Dingo Reef F	34
Dip Reef	29
Divided Island Reef	56
Dolphin Reef	9
Donovan Shoal	51
Double Cone Island Reef	39
Double Island Reef	21
Douglas Islet Reef	5, 6
Douglas Islet Reef	45
Douglas Shoal	57
Downward Patches	45
Drake Shoals	12
Draper Patch	19
Drumfish Shoal	45
Dumbell Island Reef	40
Duncan Reef	28
Dunk Island Reef	24
Eagle Reef	30
Earl Banks	51
East Bank	57
East Cay Reef	48
East Hope Island Reef	19
East Spur Reef	46
Eclipse Island Reef	28
Eddy Reef	24
Eden Reef	15
Edgell Bank	52
Edgell Reefs	40
Edward Shoals	9
Edwards Shoal	45
Eel Reef	9
Egg Rock Reef	57

REEF NAME	*BOX*
Egg Rock Reef	57
Egmont Reef	21
Egret Reef	19
Elford Reef	22
Elizabeth Reef	35
Ellen Reef	35
Ellis Reef	12
Ellison Reef	24
Elusive Reef	48
Emily Reef	19
Emperor Reef	48
Endeavour Reef	19
Erlangen Patch	6
Erskine Island Reef	57
Es Reef	12
Escape Cay Reef	45, 50
Escape Reef	19
Eshelby Island Reef	39
Esk Island Reef	28
Ethel Sand Reef	45
Eulalie Reef	35
Euston Reef	22
Eva Island Reef	28
Evening Reef	19
Eves Reef	13
Exit Reef	9
Eye Reef	17
Eyrie Reef	17
Facing Is. Reef (North Point)	57
Facing Is. Reef (Pearl Ledge)	57
Facing Is. Rf(East Pt. Ledge)	57
Facing Island Reef B	57
Facing Island Reef D	57
Facing Island Reef F	57
Fahey Reef	15
Fairey Reef A	34
Fairey Reef B	34
Fairey Reef C	34
Fairfax Islands Reef	58
Fairfax Rock Reef	45
Faith Reef	34
Fanning Shoal	45
Fantome Island Reef	28
Fantome Rocks Reef	40
Faraday Reef	29
Farmers Reef	57
Farquarson Reef A	24
Farquarson Reef B	24
Feather Reef	24
Ferdinand Shoal	45
Ferguson Reef	9

REEF NAME	*BOX*
Ferris Shoal	36
Festing Shoal	45
Fife Island Reef	12
Filmoy Shoal	40
Fin Reef	22
First Small Reef	9
Fish Reef	39
Fison Reefs	9
Fitzroy Island Reef	21
Fitzroy Reef	58
Five Reefs	6
Flat Top Island Reef	45
Flinders Island Reef A	16
Flinders Island Reef B	16
Flinders Island Reef C	16
Flinders Rock	16
Flora Reef	24
Fly Island Reef	28
Fly Reef	17
Flynn Reef	22
Foller Reef	48
Forbes Islands Reef	9
Forge Rocks Reef	40
Fork Reef	29
Forrester Reef	19
Forty Winks Reef	6
Forwood Reef	6
Four Fathom Patches	1
Four Reef	6
Franklin Reef	12
Frederick Patches	9
Frenchman Reef	12
Freshwater Point Reef	45
Frigate Cay Reef	48
Gable Reef A	41
Gable Reef B	41
Gallon Reef	9
Gannett Cay Reef	48
Garden Island Reef	28
Gargoyle Reef	35
Garioch Reef	21
Gater Reef	53
George Island Reef	45
Geranium Shoal	40
Gertrude Reef	12
Gibson Reef	24
Gilbey Reef	24
Gill Patches	19
Gilmore Bank	5
Girt Island Reef	56
Glendaver Point Reef	45

REEF NAME	*BOX*
Glennie Reef	12
Gloucester Island Reef	39
Glow Reef	29
Goldsmith Island Reef A	40
Goldsmith Island Reef B	40
Goldsmith Island Reef C	40
Goldsmith Island Reef D	40
Goodwin Shoal	52
Goold Island Reef	28
Gore Island Reef	6
Goudge Bank	24
Gould Island Reef	39
Gould Reef A	34
Gould Reef B	34
Gould Reef C	34
Gould Reef D	34
Gould Reef E	34
Grassy Island Reef	39
Great Detached Reef A	6, 7
Great Detached Reef B	7
Great Detached Reef C	6, 7
Great Detached Reef D	6, 7
Great Keppel Island Reef A	56
Great Keppel Island Reef B	56
Great Keppel Island Reef C	56
Great Keppel Island Reef D	56
Great Keppel Island Reef E	56
Great Palm Island Reef A	28
Great Palm Island Reef B	28
Great Palm Island Reef C	28
Great Palm Island Reef D	28
Great Palm Island Reef E	28
Great Palm Island Reef F	28
Great Palm Island Reef G	28
Green Island Reef (16049)	21, 22
Green Island Reef (20285)	40
Grub Reef (14003)	12, 13, 15, 16
Grub Reef (18077)	29
Gubbins Reef	19
Gull Cay Reef	50
Gull Reef	19
Gumbrell Island Reef	39
Gunga Shoal	17
Guthray Reef	6
Guthrie Shoal	57
Haberfield Shoal	57
Hackie Reef	53
Haggerstone Island Reef	9
Hales Island Reef	16
Half Moon Reef	48
Half Moon Reef	53
Half Tide Reef	48
Halfway Island Reef	56
Halfway Islet Reef	5
Hall Reef A	29
Hall Reef B	29
Hall-Thompson Reef	24
Ham Reef	12
Hamilton Island Reef A	39
Hamilton Island Reef B	39
Hammond Reef	9
Hampton Island Reef	16
Hannah Island Reef	12
Hannibal Islets Reef	5
Hardy Reef	35
Harold Island Reef	40
Harrier Reef	19
Harrington Reef	1
Harrington Shoal	1
Harrison Islet Reef	51
Harry Shoal A	45
Harry Shoal B	45
Harvey Island Reef	6
Haslewood Island Reef A	40
Haslewood Island Reef B	40
Haslewood Island Reef C	40
Haslewood Island Reef D	40
Haslewood Island Reef E	40
Hastings Reef	21, 22
Havannah Island Reef	28
Hay Island Reef	12
Hay Reef	45
Haycock Island Reef	21
Hayman Island Reef	39
Hazel Reef	9
Hazelgrove Reefs	9
Heart Reef	48
Heath Reef	12
Hedge Reef	12, 13
Hedley Reef	24
Helix Reef	29
Helsdon Reef	17
Henning Island Reef	39
Henry Reef	9
Herald Island Reef	32
Herald No.1 Reef	53
Herald Patches A	61
Herald Patches B	61
Herald Patches C	61
Herald Reef Prong	47
Heralds Prong No.2 Reef	47

REEF NAME	*BOX*
Heralds Prong No.3 Reef	47
Heron Island Reef	57
Heron Island Reef	58
Hervey Shoals A	24
Hervey Shoals B	24
Hewitt Reef	35
Hicks Island Reef	6
Hicks Reef	17
High Islands Reef A	39
High Islands Reef B	39
High Rock Reef	17
Hilder Reef	17
Hill Reef	48
Hixson Cay Reef	53
Holbourne Island Reef	34
Holt Island Reef	51
Holt Shoal	45
Hook Island Reef A	39
Hook Island Reef B	39
Hook Island Reef C	39
Hook Island Reef D	39
Hook Island Reef E	39
Hook Island Reef F	39
Hook Island Reef G	39
Hook Island Reef H	39
Hook Island Reef I	39
Hook Reef A	35
Hook Reef B	35
Hook Reef C	35
Hook Reef	53
Hope Reef (16058)	22
Hope Reef (19046)	34
Hopkinson Reef	29
Hopkinson Shoal	29
Horseshoe Reef	53
Hoskyn Islands Reef	58
Houdini Reef	48
Houghton Island Reef	16
Howard Islet Reef	46
Howard Patch Reef	53
Howick Island Reef	16
Howie Reef	24
Hudson Island Reef	28
Humpy Island Reef	56
Hunt Reefs (20129)	41
Hunt Reefs (20134)	41
Hunter Island Reef A	46
Hunter Island Reef B	46
Hunter Reefs	5
Hyde Reef	36
Hyde Rock Reef	40

REEF NAME	*BOX*
Ida Island Reef	1
Infelix Islets Reef	50
Ingot Islets Reef	40
Ingram & Beanley Islands Reef	16
Innamincka Shoal	57
Inset Reef	9
Irene Reef	19
Iris Reef	12
Iron Islet Reef	46, 51
Irving Reef	57
Jabiru Shoals	57
Jackson Patches	24
Jacqueline Reef	34
Jaguar Reef	30
James Reef	36
Jardine Islet Reef	6
Jenkins Reef	48
Jenny Louise Shoal A	22
Jenny Louise Shoal B	22
Jewell Reef	17
Joan Reef	13
Job Reef	6
John Brewer Reef	29
Johnson Patch	57
Joist Reef	35
Jones Patch	24
Jubilee Reef	12
Jukes Reef	6
June Reef	15
Junior Reef	53
Jupiter Reef	30
Kangaroo Reef A	34
Kangaroo Reef B	34
Kangaroo Shoals	9
Karamea Bank	52
Kay Reef	9
Keast Shoal	15
Kedge Reef	17
Keeper Reef	29
Kelso Reef	28, 29
Kemp Rocks Reef	9
Kennedy Reef	35
Kennedy Shoal	28
Kestrel Reef	12
Keswick Island Reef A	40
Keswick Island Reef B	40
Keswick Island Reef C	40
Keyser Island Reef	40
Kilgour Shoal	45
King Island Reef	16
King Reef	24

REEF NAME	*BOX*
Knife Reef	29
Knuckle Reef	35
Korea Reef	21
Lady Elliot Island Reef	61
Lady Elliot Reef	28
Lady Musgrave Island Reef	58
Lagoon Reef	9
Lake Reef	19
Lake Shoals	45
Lamont Reef	58
Langford and Bird Islands Reef	39
Lansdown Reef	9
Lark Reef	19
Lath Reef	35
Laurel Reef	9
Lavers Cay Reef	47, 48
Leeper Shoal	40
Leggatt Island Reef	16
Leicester Island Reef	51
Lena Reef	19
Leopard Reef	34
Liff Reefs	41
Linda Reef	2
Lindeman Island Reef A	40
Lindeman Island Reef B	40
Lindeman Island Reef C	40
Lindeman Island Reef D	40
Linden Bank	21, 22
Lindquist Island Reef	24
Line Reef	35
Lingham Island Reef	51
Linne Island Reef A	40
Linne Island Reef B	40
Linnet Reef	17
Lion Reef (12017)	9
Lion Reef (18119)	30
Lisa Jane Shoals	57
Little Banana Reef	48
Little Boydong Islet Reef	6
Little Broadhurst Reef	29
Little Bugatti Reef	41
Little Fitzroy Island Reef	21, 22
Little Kelso Reef	28, 29
Little Lindeman Island Reef	40
Little Reef	35
Little Stevens Reef	41
Littles Reef	48
Lizard Island Coconut Bay Reef	17
Lizard Island Lagoon Reef	17
Lizard Island NE Side Reef	17
Lizard Island NW Side Reef	17

REEF NAME	*BOX*
Lloyd Islands Reef	9
Lloyd Shoal	45
Lloyds Reef	9
Llwellyn Reef	58
Locksmith Island Reef	40
Lodestone Reef	29
Log Reef (12104)	9
Log Reef (12107)	9
Long Island Reef A	39
Long Island Reef B	39
Long Island Reef C	39
Long Island Reef D	39
Long Island Reef E	39
Long Island Reef F	39
Long Island Reef	50
Long Reef (15019)	19
Long Reef (21543)	48
Long Rock Reef	40
Long Sandy Reef	9
Long Shoal	39
Low Isles Reef	21
Low Islet Reef	39
Low Rock Reef	39
Low Wooded Island Reef	19
Lowrie Island Reef	12
Lupton Island Reef	40
Lynchs Reef	29
Lynx Reef	34
Lytton Reef	12
Macarthur Islands Reef	5
MacDonald Reef	12
MacGillivray Reef	17
Mackay Reef	21
Mackay Reefs	19
Maclear Island Reef	16
Maclennan Cay Reef	6
Macnamara Patch	12
Magnetic Island Reef B	32
Magnetic Island Reef C	32
Magnetic Island Reef D	32
Magnetic Island Reef E	32
Magnetic Island Reef F	32
Magnetic Island Reef G	32
Magpie Reef	12
Magra Islet Reef	6
Mai Islet Reef	1
Malcolm Patch	19
Man & Wife Rocks Reef	56
Manning Reef	57
Mantis Reef	9
Maori Reef	24

REEF NAME	*BOX*
Marble Island Reef	46
Marilyn Shoal	36
Marquis Island Reef	51
Martha Ridgway Reef A	9
Martha Ridgway Reef B	9
Martin Reef (14123)	17
Martin Reef (19075)	34
Marx Reef	19
Maschke Shoal	36
Mason Reef	6, 9
Masthead Island Reef	57
Mausoleum Island Reef	39
Maxwell Reef	17
May Reef	9
Mc Intyre Reef (19219)	36
McCulloch Reef	24
McEwen Island Reef	50
McGillivray Reef	6
McIntyre Reef (20304)	41
McSweeney Reef	6
Megaera Reef	16
Meggi-Damun Reef	1
Melanie Patches	16
Mervs Reef	48
Miall Island Reef	56
Michaelmas Reef	21, 22
Mid Reef (14066)	16
Mid Reef (19029)	34
Middle Banks Reef B	6
Middle Banks Reef C	6
Middle Banks Reef	6
Middle Cay Reef A	21
Middle Island Reef (21389)	46
Middle Island Reef (23010)	56
Middle Reef (11192)	6
Middle Reef (12072)	9
Middle Reef (19011)	32
Middle Shoal	45
Midge Island Reef	39
Miles Reef A	16
Miles Reef B	16
Milln Reef	22
Milman/Aplin Islets Reef	6
Molar Reef	41
Monsoon Reef	6
Moody Reef	9
Moore Reef	22
Moresby Bank	52
Morey Reef	21
Morinda Shoal	33
Morning Cay Reef	45
Morning Reef	19, 21
Morris Island Reef	12
Moss Reef	24
Mother Macgregor Island Reef	56
Mumford Island Reef	51
Munro Reef	16
Murdoch Island Reef	16
Murray Reef A	19
Murray Reef B	19
Murray Reef C	19
Mustard Patches A	24
Mustard Patches B	24
Myrmidon Reef	29
Mystery Cay Reef	48
Napier Reef	35
Nathan Reef	24
Needle Reef	29
Net Reef	34, 35
New Reef	12
Newry Island Reef	39
Newton Island Reef	16
Nicholas Reef	22
Niggerhead Reef	5
Night Island Reef	12
Nixon Reef	41
No Name Reef	17
Nob Island Reef	6
Noble Island Reef	16
Noddy Reef A	12
Noddy Reef B	12
Noddy Reef C	12
Noggin Reef	24
Nomad Reef	9
Noreaster Reef	24
Norman Reef	21, 22
Normanby Island Reef A	24
North Barnard Islands Reef	24
North Direction Island Reef	17
North East Island Reef	46
North Head Reef	39
North Kandalla Shoal	12
North Keppel Island Reef A	56
North Keppel Island Reef B	56
North Ledge Reef	1
North Molle Island Reef	39
North Patch Reef	45
North Pint Patch	9
North Point Cays Reef	50
North Reef A	57
North Reef B	57
North Repulse Island Reef	39

REEF NAME	*BOX*
North Warden Reef	16
North West Island Reef	57
North West Reef	22
Northern Small Detached Reef	9
Nymph Island Reef	17
Obree Reef	12
Obstruction Reef	48
Obstruction Shoal	50
Ogilvie Reef	12
Old Reef	34
Olden Island Reef	39
Olive Patch	15
One Fathom Patch Reef	50
One Tree Island Reef	58
Onslow Reef	6
Onyx Reef	22
Oom Reef (19212)	36
Oom Shoal (21002)	45
Opal Reef	21
Orpheus Island Reef A	28
Orpheus Island Reef B	28
Orpheus Island Reef C	28
Orpheus Island Reef D	28
Orpheus Island Reef E	28
Osborn Island Reef	51
Osborne Reef	12
Osterland Reef	19
Oswald Shoal	16
Ottaway Patch	19
Otter Reef	24, 28
Otterbourne Island Reef	51
Oublier Reef	35
Outer Reef	6
Outer Rock Reef	56
Outer Shoal	22
Owens Shoal	46
Oyster Reef	21
Packer Reefs	41
Pakhoi Bank	33
Paluma Shoal (11180)	6
Paluma Shoals (19005)	32
Pandora Reef (11130)	7
Pandora Reef (18051)	28
Park Shoal	45, 50
Parke Reef	17
Parker Reef	40
Parsons Reef	6
Pasco Reef	19
Passage Reef	6
Paterson Shoal	41
Paxton Shoal	45

REEF NAME	*BOX*
Peak Island Reef	56
Pearl Reef	19
Pearl Shoal	45
Pearn Rock Reef	5
Peart Reef	24
Pelican Island Reef (13107)	12
Pelican Island Reef (23017)	56
Pelican Rock Reef	51
Pellowe Reef	22
Pelorus Island Reef	28
Penrith Island Reef	45
Perry Island Reef	6
Peta Patches	40
Pethebridge Islets Reef A	17
Pethebridge Islets Reef B	17
Petricola Shoal	17
Petty Patch	19
Phillips Reef	45
Pickard Reef	9
Pickersgill Reef	19
Pigeon Island Reef (12073)	9
Pigeon Island Reef (20219)	39
Pigeon Islet Reef	39
Pike Reef	48
Pilot Reef	50
Pine Islets Reef	46
Pine Peak Island Reef	46
Piper Reef	9
Pipon Islands Reef	16
Pipon Shoal	16
Pirie Islet Reef	5
Pith Reef	29
Pixie Reef	21
Planter Shoal	45
Planton Island Reef	39
Plaster Reef	35
Pollux Reef	34
Polmaise Reef	57
Pompey Reef	41
Potter Reef A	24
Potter Reef B	24
Potter Reef C	24
Poulsen Rock	12
Poynter Island Reef	45
Prawn Reef	30
Prawn Reef	34
Pretty Patches	22
Price Cay Reef	48
Prince Reef	46
Prudhoe Shoal	45
Publicans Shoals (North)	24

REEF NAME	*BOX*
Publicans Shoals (South)	24
Pullen Reefs	19
Pumpkin Island Reef	56
Quake Reef	12
Queue Reef	6
Quoin Island Reef	9
Raaf Shoals	24
Rabbit Island Reef	39
Race Rocks Reef	45
Rafter Reef	35
Raine Island Reef	7
Rat Island Reef	57
Rattlesnake Island Reef	32
Rattlesnake Reef A	12
Rattlesnake Reef B	12
Rattlesnake Reef C	12
Rattray Island Reef	34
Rebe Reef	36
Recreation Cay Reef	48
Red Clay Island Reef	45
Red Rocks Reef	60
Redbill Island Reef	41
Redcliffe Islands Reef	39
Reef Islet Reef	45
Repair Island Reef	39
Restoration Island Reef	9
Restoration Rock Reef	9
Rib Reef	28
Ribbon Reef No.1	19
Ribbon Reef No.10	17
Ribbon Reef No.2	19
Ribbon Reef No.2	19
Ribbon Reef No.2	19
Ribbon Reef No.3	19
Ribbon Reef No.4	19
Ribbon Reef No.5	19
Ribbon Reef No.6	19
Ribbon Reef No.7	19
Ribbon Reef No.8	19
Ribbon Reef No.9	17, 19
Richards Island Reef	28
Ripple Islets Reef	51
Riptide Cay Reef	47
Robertson Reefs (1)	41
Robertson Reefs (2)	41
Robertson Reefs (3)	41
Robertson Reefs (4)	41
Rock Cod Shoal	57
Rocky Island Reef (middle)	19
Rocky Island Reef (12076)	9
Rocky Island Reef (12125)	9
Rocky Islets Reef A (northern)	17
Rocky Islets Reef A	16
Rocky Islets Reef B (northern)	17
Rocky Islets Reef B	16
Rocky Ledges Reef	16
Rocky Point Island Reef	16
Rodda Reef	13
Rodney Island Reef	6
Roseric Shoal	39
Roskruge Reef	12
Ross Islet Reef	39
Ross Reef	35
Rosser Reef	19
Rothbury Island Reef	51
Round Island Reef	24
Round Reef	35
Round Rock Reef (22065)	51
Round Rock Reef (23022)	56
Roundish Island Reef	50
Ruby Reef	19
Rudder Reef	21
Rundle Island Reef	57
Sable Chief Rocks Reef	57
Saddleback Island Reef	39
Salamander Reef	33
Sanctuary Reef	53
Sand Bank No. 5 Reef	13
Sand Bank No. 1 Reef	16
Sand Bank No. 7 Reef	12
Sand Bank No. 8 Reef	12
Sand Islet Reef	16
Sandpiper Reef	46
Sandshoe Reef	53
Sandy Shoal A	45
Sandy Shoal B	45
Satellite Reef	21
Saucer Reef	29
Saxon Reef	21, 22
Scooterboot	13
Scooterboot	16
Scott Reef	24
Seaforth Island Reef	40
Seagull Reef	34, 35
Seal Rocks Reef A	57
Seal Rocks Reef B	57
Seal Rocks Reef C	57
Second Small Reef	9
Sharland Reefs	12
Sharon Shoal A	36
Sharon Shoal B	36
Sharon Shoal C	36

REEF NAME	*BOX*
Sharon Shoal D	36
Shaw Island Reef A	40
Shaw Island Reef B	40
Shaw Island Reef C	40
Shaw Island Reef D	40
Shaw Island Reef E	40
Shaw Island Reef F	40
Shaw Island Reef G	40
Shaw Island Reef H	40
Shell Reef	34
Sheriff Shoal	41
Sherrard Island Reef	9
Shields Island Reef	51
Shortland Reef	1
Showers Reef	34
Shrimp Reef	30
Shute Island Reef	39
Sidney Island Reef	40
Silloth Rocks Reef	40
Silversmith Island Reef	40
Sim Reef	17
Sinclair Islet Reef	6
Sinclair/Morris Island Reef	16
Singleton Shoal	16
Sinker Reef	35
Sinker Reef	53
Sir Charles Hardy Islands Reef	6
Slashers No.1 Reef	29
Slashers No.2 Reef	29
Slattery Shoal	45
Small Lagoon Reef	48
Small Reef	48
Smith Island Reef	28
Smythe Shoals	45
Snake Cays Reef A	45, 50
Snake Cays Reef B	45, 50
Snake Reef	17
Snapper Island Reef	21
South Barnard Islands Reef	24
South Barren Islet Reef	50
South Bird Islands Reef	6
South Brother Rock Reef	1
South Direction Island Reef	17
South East Islets Reef	46
South Hixson Cay Reef	53
South Island Reef A	46
South Island Reef B	46
South Kandalla Shoal	12
South Ledge Reef	1
South Molle Island Reef	39
South Patch Reef	45

REEF NAME	*BOX*
South Pint Patch	9
South Reef	6, 9
South Warden Reef	16
Southampton Reef	41
Southern Small Detached Reef	9
Specie Shoal	40
Spitfire Reef	21
Spitfire Reef	21
Spoon Reef A	29
Spoon Reef B	29
Spur Reef	22
Square Reef	40
Square Rocks Reef	56
St Crispin Reef	21
St. Bees Island Reef A	40
St. Bees Island Reef B	40
St. Bees Island Reef C	40
Stagg Patches A	24
Stagg Patches B	24
Stanley Island Reef A	16
Stanley Island Reef B	16
Stanley Island Reef C	16
Stanley Island Reef D	16
Stanley Island Reef E	16
Stanley Reef	34
Stapleton Islet Reef	16
Star Reef	6
Startle Reef	19
Steene Reef	13
Stevens Reef	24
Stewart Shoal	17
Stone Island Reef	39
Stonor Patch	19
Stony Shoal	45
Stork Reef	12
Storm Cay Reef	47
Strickland Reef	19
Stucco Reef	35
Suchen Reef	12
Sudbury Reef	22, 24
Sullivan Shoal	12
Sunday Island Reef	6
Sunk Reef	9
Sunray Reef	53
Sunter Islet Reef	9
Surprise Shoal	24
Sweetlip Reef	53
Swinger Reef	19
Switzer Reef	16
Sykes Reef	12
Sykes Reef	58

REEF NAME	*BOX*
Sykes Rock Reef	56
Taiwan Reef	53
Taiwan Shoal	15
Tancred Island Reef	39
Tannadice Shoal	9
Taylor Reef	24
Temple Island Reef	45
Temple Islets Reef	45
Ten Pin Rock Reef	51
Tern Island Reef	1
Tern Island Reef	41
Thetford Reef	22
Thimble Shoal	29
Thomas Island Reef	40
Thorpe Island Reef	24
Thread Shoal	29
Three Fathom Patch	39
Three Isles Reef	19
Three Reefs	6
Throne Shoals	12
Thrush Reef	6
Tide Island Reef	50
Tideway Reef A	35, 40
Tideway Reef B	35, 40
Tideway Reef C	35
Tiger Reef	34
Tijou Reef	12
Tilbrook Bank	19
Timandra Bank	57
Tink Shoal	33
Tinonee Bank	45
Tinonee Peak Island Reef	45
Tinsmith Island Reef	40
Tobias Reef	34
Tobias Spit	24
Tompson Shoal	36
Tongue Reef	21
Torch Shoal	45
Tornado Rocks Reef A	50
Tornado Rocks Reef B	50
Treat Reef	12
Triangle Reef (10391)	2, 3
Triangle Reef (21570)	48
Triangular Island Reef	51
Trunk Reef	28
Tryon Island Reef	57
Tupper Shoal	45
Turn Island Reef	45
Turn Shoal	51
Turner Cay Reef	48
Turning Point Patches Reef	6

REEF NAME	*BOX*
Turrum Cay Reef	48
Turtle Group Reef A	17
Turtle Group Reef B	17
Turtle Group Reef C	17
Turtle Group Reef D	17
Turtle Group Reef E	17
Turtle Group Reef F	17
Turtle Group Reef G	17
Turtle Group Reef H	17
Turtle Group Reef I	17
Turtle Head Island Reef A	1
Turtle Head Island Reef B	1
Turtle Island Reef (10340)	1
Turtle Island Reef (22027)	50
Turtle Island Reef (23085)	57
Turtle Reef A	17
Turtle Reef B	17
Turtle Reef	48
Twin Cay Reef (21495)	48
Twin Cay Reef (21497)	48
Twin Cays Reef (21166)	47
Twin Reefs (11193)	6, 9
Twins Reef (22146)	53
Two Isles Reef	19
Tydeman Reef	13
Tynemouth Island Reef A	46
Tynemouth Island Reef B	46
Tynemouth Island Reef B	51
Tyrrel Reefs	9
Plum Pudding Island Reef	39
Underwood Shoal	17
Undine Reef A	21
Undine Reef B	21
Unison Reef	16
Unity Reef	21
Upolu Cay Reef	21
Urchin Shoal	29
Victor Islet Reef	45
Viking Reef	5, 6
Viper Reef	30
Virago Shoal	32
Viscount Shoal A	45
Viscount Shoal B	45
Viscount Shoal C	45
Vlasoff Reef 21	22
Volskow Island Reef	40
Wackett Reef	36
Wade Reef	48
Waight Bank	9
Waining Reef	17
Wallaby Reef	34

REEF NAME	*BOX*
Wallace Islet Reef	6
Waratah Shoal	45
Wardle Reef	24
Warland Reef	41
Wasp Reef	12
Waterwitch Reef	12
Watson Island Reef	16
Wedge Island Reef	40
Wedge Island Reef	56
Wedge Rocks Reef	16
Weigall Reef A	16
Weigall Reef B	16
Wentworth Reef	21
West Hill Island Reef	45
West Hope Island Reef	19
West Molle Island Reef	39
West Reef	45
West Side Island Reef	50
West Spur Reef	46
Wharton Reef	15
Wharton Reef	16
Wheatley Shoal	40
Wheeler Island Reef	28
Wheeler Reef	29
White Shoal	51
White Tip Reef	36
Whites Bay Reef	46
Whitsunday Island Reef A	39
Whitsunday Island Reef B	39
Whitsunday Island Reef C	39, 40
whitsunday Island Reef D	40
Whitsunday Island Reef E	40
Whitsunday Island Reef F	40
Whitsunday Island Reef G	40
Whitsunday Island Reef H	39
Whitsunday Island Reef I	39
Whitsunday Island Reef J	39
Whitsunday Island Reef K	39
Whitsunday Island Reef L	39
Whitsunday Island Reef M	39
Whitsunday Island Reef N	39
Wigton Island Reef A	40
Wigton Island Reef B	40
Wild Duck Island Reef	45, 50
Wilds Shoal	6
Wilkie Island Reef	12
William Reef	9
William Reef	9
Williams Reef	36
Williams Shoal	45
Williamson Reefs	19
Wilsen Shoal	12
Wilson Island Reef	57
Wilson Reef (13129)	13
Wilson Reef (22086)	53
Wilson Shoal	33
Winter Shoal	39
Wishbone Reef	9
Wistari Reef	57
Wizard Reef	5, 6
Wooden Patch	16
Wreck Island Reef	57
Wreck Reef	6
Wup Reef	41
Wyatt Earp Reef	36
Wyborn Reef	1
Wye Reef	9
Yamacutta Reef	24
Yankee Reef	29
Yaralla Shoal	45
Yonge Reef	17
Young Reef	9
Yule Detached Reef	6, 7
Yule Reef	21
Zenith Reef	9
Zodiac Cay Reef	48

APPENDIX C: LIST OF NAMED CYCLONES WITHIN 100 KM OF THE GBR REGION, FROM 1968-1969 TO 1996-1997

1968-1969	
Bridget	(Jan)
1969-1970	
Ada	(Jan)
Cindy	(Mar)
Dawn	(Feb)
1970-1971	
Dora	(Feb)
Fiona	(Feb)
Gertie	(Feb)
Lena	(Mar)
1971-1972	
Althea	(Dec)
Bronwyn	(Jan)
Daisy	(Feb)
Emily	(Mar)
Faith	(Apr)
1972-1973	
Kirsty	(Feb)
Leah	(Feb)
Madge	(Mar)
1973-1974	
Alice	(Mar)
Una	(Dec)
Vera	(Jan)
Wanda	(Jan)
Yvonne	(Feb)
Zoe	(Mar)
1974-1975	
Gloria	(Jan)
1975-1976	
Alan	(Jan/Feb)
Beth	(Feb)
David	(Jan)
Dawn	(Mar)
Watorea	(Apr)
1976-1977	
Keith	(Jan)
Nancy	(Feb)
Otto	(Mar)
1977-1978	
Hal	(Apr)
Gwen	(Feb)
1978-1979	
Gordon	(Jan)
Greta	(Jan)
Kerry	(Feb/Mar)
Peter	(Dec/Jan)
Rosa	(Feb)
Stan	(Apr)
1979-1980	
Paul	(Jan)
Ruth	(Feb)
Simon	(Feb)
1980-1981	
Cliff	(Feb)
Eddie	(Feb)
Freda	(Feb)
1981-1982	
Dominic	(Apr)
1982-1983	
Des	(Jan)
Elinor	(Feb)
1983-1984	
Grace	(Jan)
Ingrid	(Feb)
Jim	(Mar)
Kathy	(Mar)
Lance	(Apr)
1984-1985	
Monica	(Dec)
Nigel	(Jan)
Odette	(Jan)
Pierre	(Feb)
Rebecca	(Feb)
Tanya	(Mar)
1985-1986	
Manu	(Apr)
Vernon	(Jan)
Winifred	(Jan)
1986-1987	
Jason	(Feb)
1987-1988	
Charlie	(Feb)
1988-1989	
Aivu	(Mar/Apr)
Delilah	(Dec/Jan)
Meena	(May)
1989-1990	
Ivor	(Mar)
Felicity	(Dec)
Hilda	(Mar)
Nancy	(Jan/Feb)
1990-1991	
Joy	(Dec)
Kelvin	(Feb)
1991-1992	
Fran	(Mar)
Mark	(Jan)
1992-1993	
Nina	(Dec/Jan)
Oliver	(Feb)
Roger	(Mar)
1993-1994	
Rewa	(Dec/Jan)
1994-1995	
-	
1995-1996	
Celeste	(Jan)
Dennis	(Feb)
Ethel	(Mar)
1996-1997	
Gillian	(Feb)
Ita	(Feb)
Justin	(Mar)

APPENDIX D: LIST OF NAMED CYCLONES WITHIN 100 KM OF THE GBR REGION, FROM 1968-1969 TO 1996-1997 BY MONTH

November
-

December
Althea, 1971
Una, 1973
Peter, 1978
Monica, 1984
Delilah, 1988
Felicity, 1989
Joy, 1990
Nina, 1992
Rewa, 1993

January
Bridget, 1969
Bronwyn, 1972
Vera, 1974
Wanda, 1974
Gloria, 1975
Alan, 1976
David, 1976
Keith, 1977
Gordon, 1978
Greta, 1978
Peter, 1978
Paul, 1980
Des, 1983
Grace, 1984
Nigel, 1985
Odette, 1985
Vernon, 1986
Winifred, 1986
Delilah, 1989
Nancy, 1990
Mark, 1992
Nina, 1993
Rewa, 1994
Celeste, 1996

February
Dawn, 1970
Dora, 1971
Fiona, 1971
Gertie, 1971
Daisy, 1972
Leah, 1972
Yvonne, 1974
Alan, 1976
Beth, 1976
Nancy, 1977
Gwen, 1978
Kerry, 1979
Rosa, 1979
Ruth, 1980
Simon, 1980
Cliff, 1981
Eddie, 1981
Freda, 1981
Elinor, 1983
Ingrid, 1984
Pierre, 1985
Rebecca, 1985
Jason, 1987
Charlie, 1988
Nancy, 1990
Kelvin, 1991
Oliver, 1993
Dennis, 1996
Gillian, 1997
Ita, 1997

March
Cindy, 1970
Lena, 1971
Emily, 1972
Madge, 1973
Alice, 1974
Zoe, 1974
Dawn, 1976
Otto, 1976
Kerry, 1976
Jim, 1984
Kathy, 1984
Tanya, 1985
Aivu, 1989
Ivor, 1990
Hilda, 1990
Fran, 1992
Roger, 1993
Ethel, 1996
Justin, 1997

April
Faith, 1972
Watorea, 1976
Hal, 1978
Stan, 1979
Dominic, 1982
Lance, 1984
Manu, 1986
Aivu, 1989

May
Meena, 1989

June
-

July
-

August
-

September
-

October
-