100 Years of National Topographic Mapping

Australia's First 1:250,000 Scale, Uniform Topographic Map Coverage: The R502 Story

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Abstract

Completed in 1968, the R502 series of topographic maps provided Australia's first uniform topographic map coverage at a scale of 1:250,000. Production of the R502 map series was a significant, national achievement that involved considerable co-operative effort amongst Commonwealth (civilian and military) and State government mapping agencies as well as private sector organisations. The R502 series comprised 540 printed map sheets and was based entirely on aerial photography. This paper traces the history of the R502 series of topographic maps by outlining the post-Federation administrative arrangements for Commonwealth government mapping activities. The paper also notes the eventually pressing demands for the topographic mapping of Australia, which gave rise to the R502 mapping program. The slow build up to the commencement of the R502 mapping program, its component parts and its achievement are then discussed.

Introduction

The 1:250,000 scale R502 series of maps was the first uniform medium scale topographic map coverage of Australia. Each standard map sheet covered an area bounded by 1.5 degrees of longitude and 1 degree of latitude (about 150 kilometres from east to west and 110 kilometres from north to south). At 1:250,000 scale, 1mm on the map represents 250 metres on the ground. The R502 series comprised a total of 540 printed maps (Division of National Mapping 1968). Production of the R502 map series commenced around 1956. All sheet compilations were finalised by 1966 and printing of all the maps of the series was completed by the end of 1968. The Division of National Mapping and Royal Australian Survey Corps each compiled around 40 per cent of the map sheets. State mapping authorities in Western Australia (17%), Queensland, Tasmania, and South Australia compiled the remainder. The Royal Australian Survey Corps and National Mapping were responsible for printing all of the map sheets. Private sector organisations supplied some horizontal control (such as from petroleum exploration surveys) as well as various other services under contract. Thus, completion of the R502 map series involved an outstanding national peace-time co-operative effort. Australia's mapping infrastructure continued to strengthen after completion of the R502 map series. By 1991, densification of horizontal and vertical control networks was such that the R502 series was replaced by the 1:250,000 scale National Topographic Map Series (NTMS). The NTMS series was compiled at 1:100,000 scale and the new 1:250,000 scale map sheets were derived from the 1:100,000 scale compilations (O'Donnell 2006).

The enormity of the R502 series mapping task for Australia is indicated in Table 1, which shows the area of Australia and its 1954 population compared with those of the United States and Canada. Simplistically, every square kilometre of mapping in Australia was to support

just over one person, whereas in Canada, it was nearly two people and in the United States, it was over 16 people.

Country	Australia	Canada	U.S.A.
1954 Population	9 million	15 million	163 million
Area (sq km)	7.7 million	9.1 million	9.8 million
People per sq km	1.2	1.7	16.6

Table 1: Comparison of Populations and Areas in Selected Countries.
Note: Data for this table came from various Google searches. The 1954 Australian population figure is the actual census figure. Canada and USA are of comparable areal size to Australia.

With such a low population base and coming just after World War 2, it is perhaps understandable that the R502 mapping program was beset with problems of funding as well as those of bureaucracy and changing of priorities. As Lines (1992) pointed out, in the period just after the war, the lack of trained staff continually impacted progress. Nevertheless, the program was successfully completed in around 12 years.

In tracing the evolution of the R502 series of topographic mapping, this paper outlines the demands for the topographic mapping of Australia. It also outlines the post-Federation Commonwealth government administrative arrangements for topographic mapping that emerged in response. The subsequent establishment of the R502 series topographic map program with decimal scale, the slow start to this program, its component parts and its achievement are then discussed.

The plan emerges

Commonwealth Gazette No. 1, of 1 January 1901 established the Department of Home Affairs to carry out a ‘servicing’ role. While surveying and mapping functions were seen as appropriate for a servicing department, none were ceded by the States to the Commonwealth at Federation. However, with the passing of the Commonwealth Lands Acquisition Act of 1906, a number of surveying and mapping functions transferred from the States to the Commonwealth. This legislation allowed the Commonwealth’s small, civilian mapping requirement to be met by the Lands and Survey staff of the Department for Home and Territories (Anon 1964).

The genesis of systematic topographic mapping in Australia is considered to be 1907, when the Defence Forces commenced producing strategic maps and plans by adding contours and topographic detail to existing cadastral material (Lambert 1976). This methodology was found to be inefficient, as the cadastral mapping was generally unrelated to a homogeneous base. The Survey Section of the Royal Australian Engineers (RAE) was established in 1910, now using the existing State triangulation systems as the control framework for their topographic maps. By 1914 their own geodetic sub-section was formed to perform triangulation ahead of the topographers. These two events saw the topographic mapping of Australia (at 1:63,360 or 1 mile to 1 inch scale also called ‘One inch’) deemed worthy of resourcing (Coulthard-Clark 2000). The Survey Section of the RAE became the Australian Survey Corps in 1915 and subsequently the Royal Australian Survey Corps (RA Survey) in 1948. For simplicity, RA Survey is used throughout this paper when referring to the Survey Corps of the Australian Army.

A resolution from the Conference of Surveyors-General in Melbourne during 20-25 May 1912 contained detailed proposals for a National Geodetic Survey of Australia. That conference recognised that such a geodetic survey was absolutely necessary for the production of accurate maps (Conference of Surveyors-General 1912). During World War 1 (1914-1918), Australia focussed nationally on the war effort and many survey and mapping personnel served overseas. On their return from this service, many of these personnel were employed by the States' survey organisations.

In 1921, topographic mapping became a Commonwealth responsibility within the Lands and Survey Branch of the Department of Home and Territories. Notwithstanding this development and the pockets of RA Survey 'One inch' mapping work, nationally there had been no progress on survey or mapping. The need for a national geodetic and topographic survey of Australia was again highlighted during the first Interstate Conference of the Australian Surveyors' Institutes, held in Melbourne in November 1927. At that conference, the Director of Commonwealth Lands and Surveys delivered a paper: *The Need for a Geodetic Survey of Australia.* In this paper, the Director described a topographic survey with contours (derived from aerial photography) as being vital (Percival 1928). In addition, the President of the Surveyors' Institutes contributed a paper: *On the Need for a Topographical Survey of Australia* (Montgomery 1928). The Institutes' President was forthright in observing that Australia had lagged behind other Commonwealth countries in mapping and asked how long was Australia prepared to continue to do so. Apart from the economic benefits, the President stated that every pound spent on good maps was an insurance against loss and disaster in the military field. These were prophetic words indeed in the light of Australia's mapping situation at the outbreak of World War 2 in 1939.

The lack of adequate topographic map coverage of Australia was further highlighted by the Victorian representative of the Development and Migration Commission. He requested that delegates to the 1927 Conference assist in the preparation of a statement on the need for topographical maps of Australia. Submissions were to be forwarded to the conference President for consolidation and subsequent presentation to government. To follow through on this request, the Australian Survey Committee - ASC (not to be confused with the later Commonwealth Survey Committee) was formed. This committee had representatives from surveyors, engineers, mining and metallurgy, academia and the Victorian Government Astronomer. The Development and Migration Commission provided the secretary. Input was also received, from the Defence department and the Director of Commonwealth Lands and Surveys (Australian Survey Committee 1929).

In October 1928, the chair of the Development and Migration Commission requested that the chair of the ASC put forward a national scheme of topographical mapping. This scheme was contained in the *Report on the Need for a Geodetic and Topographical Survey of Australia* (Australian Survey Committee 1929). The ASC concluded that it was essential for a first order geodetic survey to be carried out, so that adequate topographical maps of Australia could be produced and all survey work could be co-ordinated. ASC also proposed the formation of a national committee, not unlike the later National Mapping Council, be formed. This first ASC report was presented to the Commonwealth government on 18 February 1930.

The government claimed stringent financial limitations prevented take up of the report's recommendations; but left some hope by indicating that the recommendations might be reconsidered at a better time. In 1932, the Department of Interior was created (Commonwealth Gazette No. 33 of 14 April 1932) and the Commonwealth's surveying,

mapping and property functions were transferred to that department. However, there was still no action on the ASC's recommendations. The ASC met again on 27 September 1933 and considered whether the Commonwealth government should again be approached to start the geodetic and topographical survey of Australia. However, as there had been general economic improvement and additional information collected in the intervening years, ASC decided to submit a second report. This second report also advanced that the scale of 1 mile to 1 inch was the most useful for such topographical mapping. These recommendations supported an agreement reached in November 1929 between the Surveyors-General of the States and a representative of the Defence Department to facilitate future topographical mapping. The ASC's second report was presented to the Minister for Development, on 23 November 1934 (Australian Survey Committee 1935). Unfortunately, as with the ASC's first report, this second report received little Commonwealth government support.

With the commencement of a number of major independent survey and mapping activities in early 1935, the chair of the ASC, the Department of Defence and the Institution of Engineers, Australia saw the need for a co-ordinating body and voiced such opinion to the Commonwealth government. The government's response was to establish the Commonwealth Survey Committee (CSC) in late 1935 with a view to ensuring the future co-ordination of surveys throughout Australia. The CSC was chaired by the Commonwealth Surveyor-General, with representatives of the three Defence services (Navy, Army and Air Force). Co-ordination with the States was achieved through the Commonwealth Surveyor-General. The CSC reported in 1936 but its recommendations were deferred and as World War 2 intervened, they did not meet again until August 1944.

During 1930-37, Donald George Mackay led four private aerial survey expeditions to map the largely unknown Australian interior. For the first expedition in 1930, a base camp was established near llbpilla Soak about 350 km north-west of Alice Springs. From there the work extended radially out to a distance of about 250km. This expedition found a very large, dry lake astride the Western Australia /Northern Territory border. This lake is now known as Lake Mackay. A second expedition took place in 1933 and operated from Docker River in the Northern Territory and Roy Hill and Fitzroy Crossing in Western Australia. The three base sites formed a triangle with sides about 1000 km in length (the range of Mackay's aircraft). From these bases, large areas of the Great Sandy and Gibson Deserts were surveyed. Mackay's 1935 expedition surveyed a strip of country about 1400 km long and about 500 km wide, immediately to the north of the trans-continental railway. It used bases at Cook, Forrest, Laverton, Oodnadatta and Rawlinna. Mackay's fourth and final expedition in 1937 was based at Tanami (about 470 km due west of Tennant Creek) and Roy Hill again. The 1937 expedition filled in some gaps from previous flights (Canon 1987). Although the final maps could only be regarded as 'reconnaissance', nonetheless they portrayed significant topographic features. The areas of Mackay's surveys are shown in Figure 1.

At the outbreak of World War 2, less than 2 per cent of Australia had been mapped at 'One inch'. This coverage comprised some 80 map sheets (approximately 40,000 square miles) in New South Wales, Victoria and Queensland. This coverage is shown in Figure 2a. A result of RA Survey's own efforts, this mapping was produced post World War 1 at an average rate of about 4 map sheets per year (Lambert 1969). The Commonwealth Surveyor-General (who later also became the first Director of National Mapping), recalled: 'the inadequacy of our maps became more fully apparent when the Japanese were on our threshold in 1942. It is probable that they were better informed on the topography of parts of New Guinea then we ourselves were' (Johnston 1962). This predicament led to the instigation of the Emergency

Mapping Scheme in November 1940. The Scheme's first step was to accelerate the 'One inch' mapping program but it soon became evident that the required emergency timeframe for completion was completely unachievable. While mapping at 'One inch' continued, new series at 1:506,880 (8 miles to 1 inch) scale and 1:253,440 (4 miles to 1 inch) scale were commenced. To fulfil the Scheme's requirements photo-mosaics were also prepared. During World War 2 topographic map coverage advanced significantly. Some 60 map sheets at 1:506,880 scale, 230 sheets at 1:253,440 scale, and 342 sheets at 1:63,360 scale map sheets were produced (172 sheets at the 1:63,360 scale being Standard Editions). This coverage is shown in Figure 2b. However, owing to the necessarily tight production timeframe, the quality of this mapping varied (Lambert 1969).

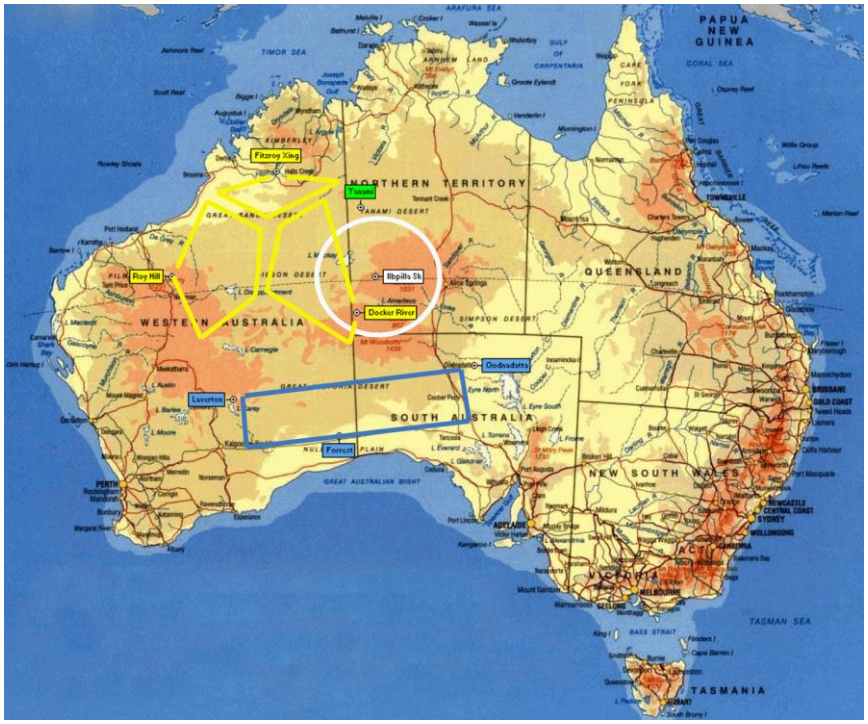

Figure 1 – Areas covered by Mackay's expeditions between 1930 and 1937.

The August 1944 meeting of the Commonwealth Survey Committee (CSC) passed thirteen resolutions. Resolutions 2 and 3 recommended the adoption of the 4 miles and 1 mile to 1 inch map series (as were being produced by RA Survey at that time) as the basic type of map for a national survey. Further, the CSC held the opinion that as a national undertaking, a national survey should be financed by the Commonwealth. CSC's Resolution 12 recommended that, at their next meeting the State Surveyors-General confer with the Commonwealth Surveyor-General and the Commonwealth Survey Committee. This resolution gave rise to the Commonwealth Survey Committee and State Surveyors-General Conference of 15-19 January 1945 (Commonwealth Survey Committee undated). The recommendations of that conference received Commonwealth government approval on 7 March 1945 and provided for the formation of the National Mapping Council (NMC).

The new National Mapping Council was to be chaired by the Commonwealth Surveyor-General who was also to be the Director of National Mapping. This new Director was responsible for the co-ordination of the activities of Commonwealth and State authorities in planning and carrying out the National Mapping of Australia with full regard to the recommendations of the National Mapping Council.

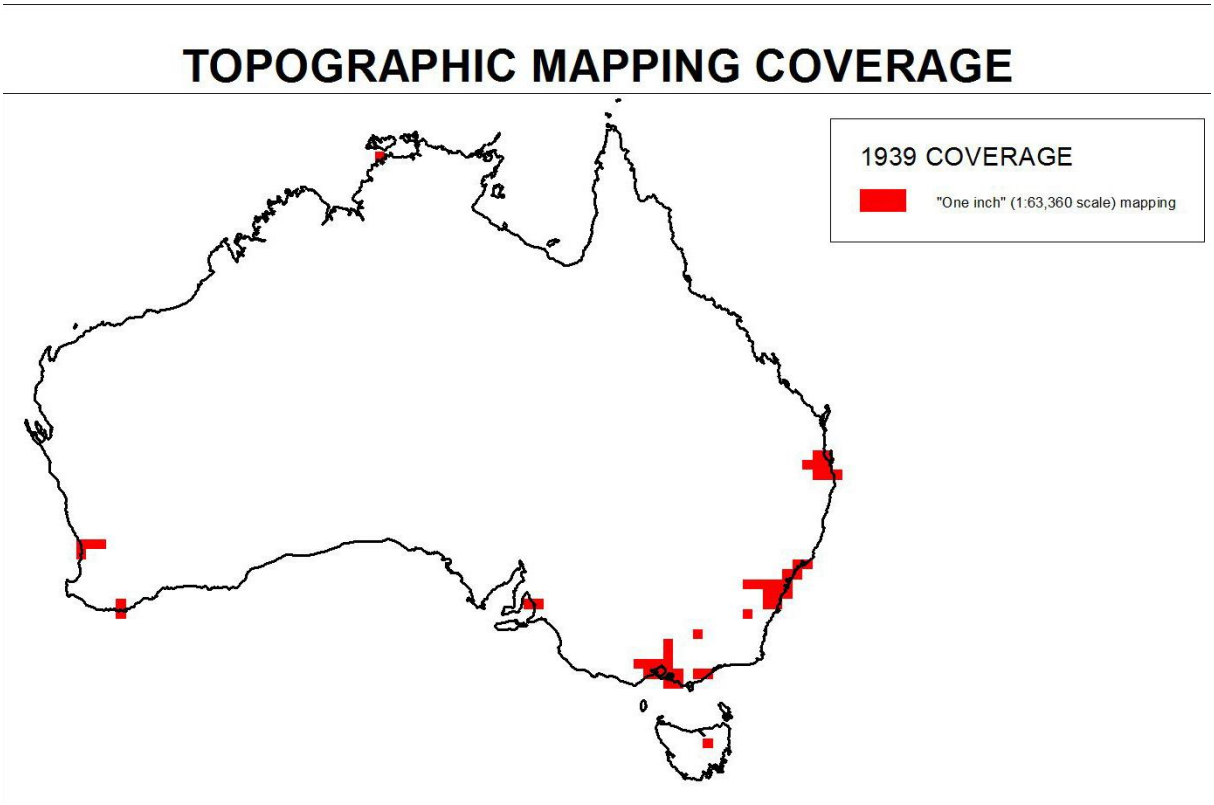

Figure 2a – Topographic Mapping ("One inch" scale) coverage in 1939 (Tyson 1965).

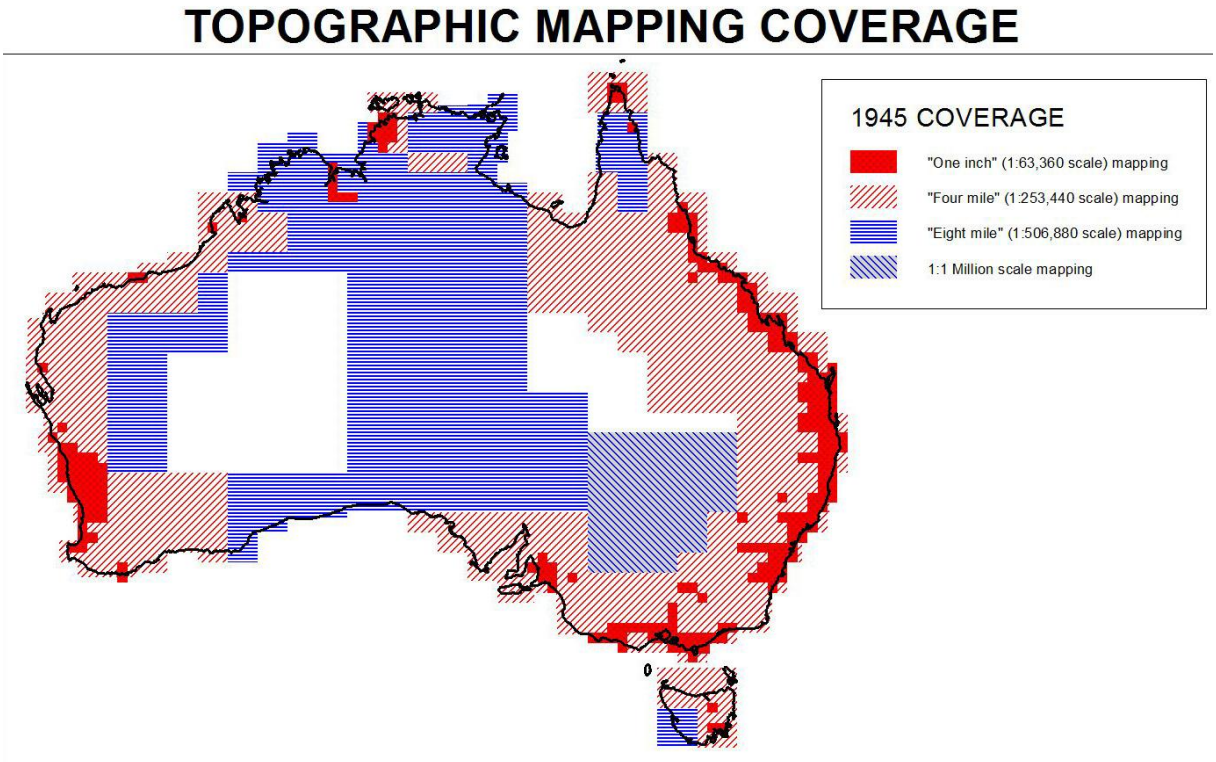

Figure 2b – Topographic Mapping coverage in 1945 at the conclusion of the Emergency Mapping Scheme (Tyson 1965).

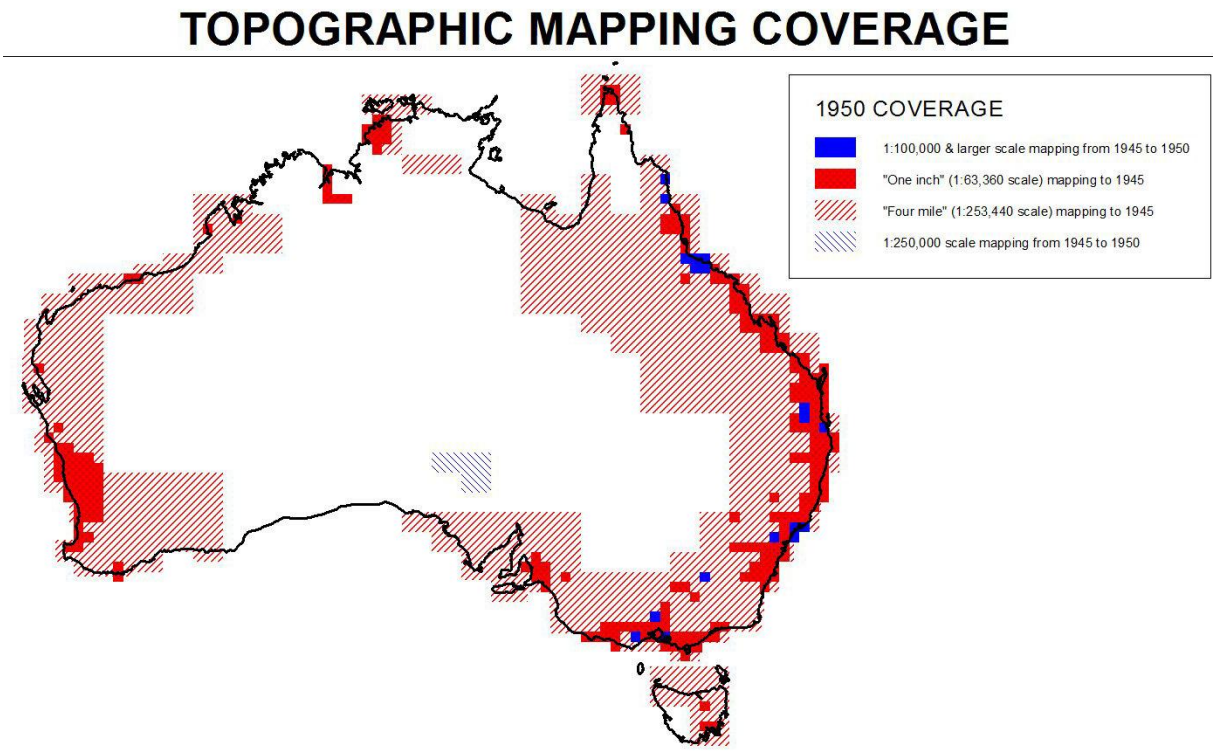

Figure 2c – Topographic Mapping coverage in 1950 (National Mapping Council 1966).

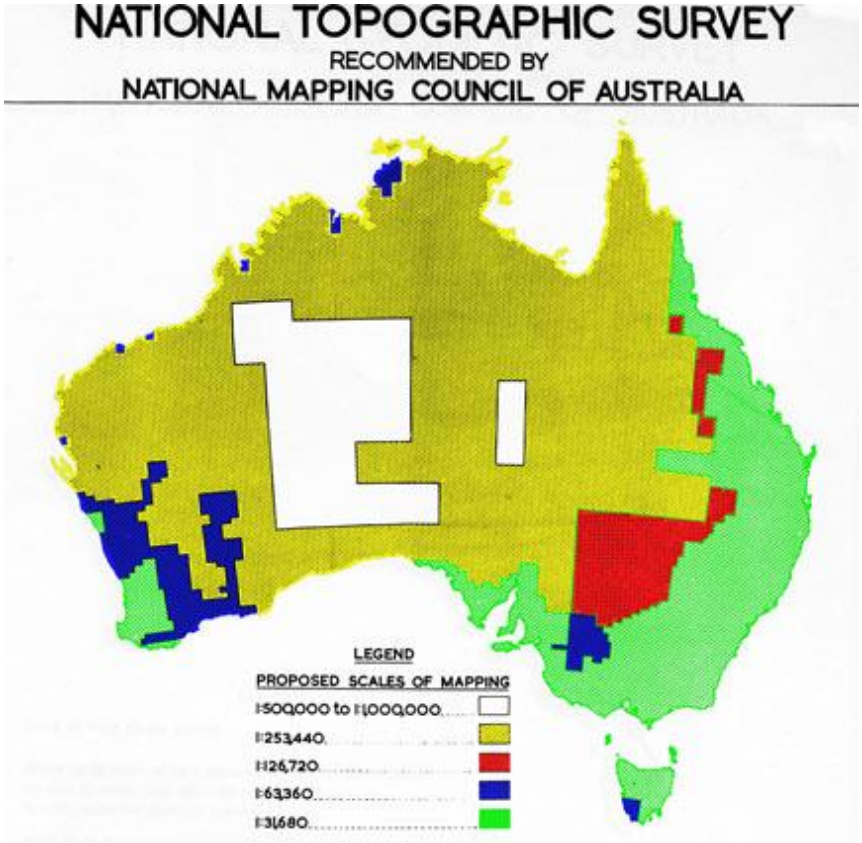

Figure 3 – National Mapping Council diagram of April 1956 showing the imperial map scales recommended for mapping the different regions of Australia (Lambert 1956).

The January 1945 conference also believed 1 mile to 1 inch scale and 4 miles to 1 inch scale topographical maps were required for national mapping (Commonwealth Survey Committee and State Surveyors-General 1945). The 4 miles to 1 inch scale was later ratified by NMC Resolution 57 of 1948. That resolution also provided that outside specific, designated or most densely populated areas of the country 4 miles to 1 inch was considered a suitable scale (Lines 1992).

In the following years the scales at which Australia would be mapped were reviewed by the NMC. If mapping Australia at 'One inch' was too immense a task in war-time, in peace-time it was totally impractical. It was more logical, as had been seen during World War 2, to map specific areas at specific scales. Refer to Figure 3, an NMC diagram showing the imperial map scales recommended for mapping the different regions of Australia (Lambert 1956). The question of map scales was finally resolved in 1959 with the NMC's adoption of metric scales.

At NMC's commencement, the Commonwealth Survey Committee was given a seat on the new Council. This seat was usually taken by the Director of Military Survey. However, in 1947, the CSC was re-organised. Its membership was expanded with the Commonwealth Surveyor-General (who was also Director of National Mapping) as chair. The CSC chair would recommend to the Minister for the Interior any actions necessary for the co-ordination of the mapping activities of Commonwealth departments. Soon after the formation of the NMC, its obligations grew to such an extent that its chair shouldered onerous responsibilities. Not only was he responsible as Director of National Mapping and as Commonwealth Surveyor-General but also as the Commonwealth's Chief Property Officer. In 1947, to help address this situation, a Deputy was appointed to assist with the Director of National Mapping function. The new Deputy headed the National Mapping Section, Property and Survey Branch, Department of Interior. In 1951, the arrangement for the Commonwealth Surveyor-General to also be Director of National Mapping was terminated. The Deputy Director then became the Director of National Mapping and in that capacity chair of the NMC. Under this change, the Commonwealth Surveyor-General relinquished the chair of the NMC but remained a member of that Council. (The new arrangements provided the Commonwealth Surveyor-General some relief from his onerous work-load.)

Also in 1951, the National Mapping Section was renamed the National Mapping Office. This change saw the Office actively commence its part in the Australian geodetic survey (Ford 1979). The National Mapping Office worked co-operatively with RA Survey and State authorities with an initial aim to expand the geodetic network and to strengthen and unify existing survey control.

By 1951, Brown (1951) records that only twelve per cent of Australia was covered by topographic maps (equivalent in area to about the size of South Australia) even though most of these maps lacked height information. Map coverage with heights and contours at 1 mile to 1 inch and larger scales existed for just three per cent the country. Figure 2c, shows the map coverage as reported by the NMC in 1950, and is indicative of the coverage noted by Brown. In 1951, Major-General R. Ll. Brown C.B., O.B.E, F.H.I.C.S., Director-General Ordnance Survey of Great Britain, was invited to Australia to report to the Minister for the Department of the Army on specific terms of reference. These addressed RA Survey's future work program and interaction with civilian agencies. While his main report of December 1951 deals with those issues, Appendix G reflected Brown's own views on key aspects of topographic mapping. Brown's most relevant points were:

> ‘Since the war discussions on standardisation have taken place, and the scales of maps and charts affecting land operations have now been standardised for the armies of the United States, United Kingdom, and Canada. The object of this standardisation is to enable the mapping agencies of the three countries to supply the armed forces with the maps essential for military operations and to simplify map usage.
>
> The standard scales agreed are all decimal scales.
>
> The agreement designates these as the scales which shall be used by the three powers, and as the goal toward which they shall urge all other mapping agencies in order to facilitate future military mapping.
>
> The standardisation of military mapping scales by these three North Atlantic powers cannot be without affect upon mapping in other parts of the world, and Australia will naturally wish to take this into account when considering her domestic mapping.
>
> The Four-mile scale is so close to the 1/250,000 scale that for many practical purposes there is no difference. This is true also for many military purposes, but not all.
>
> The territories in which she [Australia] may be interested are thus on the 1/250,000 scale. A change in Australia appears practicable, and if it is to be made, the sooner it is made the better.
>
> These considerations have been put forward, more to prevent them from being overlooked when policy is discussed than to urge the intrinsic value of decimal scales. This trend [to metric] may in the end prove irresistible, both because of the increasing disadvantage in a modern world of the lack of uniformity in this matter, and because no system other than the metric system has any chance of universal acceptance.
>
> So far as mapping is concerned, Australia has as yet done little (as compared with older countries), that a change to decimal scales, and even the metre, would be a simple matter now compared with what it will be later when Australia is better mapped’ (Brown 1951).

Based on his own experience with national mapping in Great Britain, Brown noted that Australia needed to have a single mapping authority responsible for its national mapping activities. In 1954 in response to Brown’s report, the Commonwealth government established the Department of Interior as the ‘responsible authority’ for topographic surveys and mapping in Australia. In addition, a standing Advisory Committee (later to be known as Advisory Committee on Commonwealth Mapping - ACOCM) was formed and the Commonwealth Survey Committee disbanded. The CSC’s former representative on the National Mapping Council, the Director of Military Survey, later became a member of the NMC in their own right. ACOCM’s members were: the Secretary, Department of Interior; the Secretary, Department of the Army; a nominee from the Institution of Surveyors, Australia. Its Executive Officer was the Director of National Mapping (who also chaired the NMC). ACOCM’s role was ‘the planning and co-ordination of Australia’s future geodetic and topographic surveys and mapping’.

Also in 1954, following establishment of the Southeast Asia Treaty Organization (SEATO) Australia was required to comply with that Treaty’s standardisation agreements. RA Survey

noted both the need for this compliance (specifically in relation to map scales, units and symbology) and Brown's comments relating to decimal scale. Accordingly, RA Survey informed ACOCM that they would like Australian mapping to so comply. With ACOCM having the appropriate administrative authority, all the issues relating to a national topographic mapping program for Australia could now be addressed. Consequently, the mid-1955 *Recommended Plan of Mapping Operations* emerged. This plan included a 1:250,000 scale national topographic map series that incorporated the standardisation compliance requested by RA Survey. Commonwealth government approval came only months later.

From plan to reality

Two events in 1956 helped lay the foundation for a national, uniform, 1:250,000 scale series of topographic maps, compiled predominantly from aerial photography. In May, the National Mapping Office in the Department of the Interior became the Division of National Mapping within the Department of National Development. In July, the Division of National Mapping received a budget allocation for mapping, essentially in the form of continuing payments to the States for their topographic mapping work that was suitable for use in the national mapping program.

The above two events started to address the three major problems that had forced peace time topographic map makers to compromise since the late 1940s: Firstly, how to rapidly provide comprehensive horizontal and vertical control for aerial photography that contained the topographic information needed over vast areas of Australia where little or no map control existed? Secondly, how best to extract the required information from controlled aerial photography to make the planimetric maps. Finally, even if the first two problems could be resolved, how was the required volume of printed maps to be produced? These problems were exacerbated, as mentioned in the introduction, by the severe lack of trained personnel after World War 2. The compromise had been the production of semi-controlled photo-mosaics (often referred to as photomaps). Based on aerial photography acquired post-war, approximately positioned but usable topographic information in photomap form had been produced quickly in sufficient quantity to meet demand. However, this outcome was at the cost of greatly reduced production of cartographic (line) maps.

Post-war aerial photography coverage was an on-going requirement that saw camera equipped Royal Australian Air Force aircraft operating in most States. In the period from June 1947 to June 1948, the RAAF was very active photographing over of one tenth of Australia with 40,000 photographs (Manning 1988). In March 1948, the RAAF aerial photography squadron was designated as 87 (Survey) Squadron. In 1953, however, the government directed that contracts should be let to commercial aerial survey companies for any aerial photography required by Commonwealth departments up to a limit of £120,000 per annum. The RAAF's role in civilian mapping photographic acquisition subsequently ceased. National Mapping's 1956 budget, mentioned above, included £120,000 for continued aerial photography acquisition. Thus, 1:50,000 scale aerial photography supplied by the RAAF and civilian contractors was used for most of the R502 series mapping (Hocking 1987).

The establishment of the Division of National Mapping in 1956 allowed that Division to seek the resources necessary for a topographic mapping program. This funding helped to address but initially did not alleviate the previously mentioned topographic mapping problems nevertheless progress had commenced. With budget funding, however, came greater

accountability and a realisation that mapping to meet national development priorities did not necessarily coincide with the current Defence or State mapping priorities. For national development needs mapping for matters such as the whereabouts of oil, gas, minerals, and water was required as well as interstate transport infrastructure routings.

Defence and State mapping priorities in populated coastal areas and in northern Australia generally did not assist with locating such resources. This lack of coincidence in mapping priorities between the various agencies was borne out in a 1958 Commonwealth government directive requiring National Mapping's program be focussed on the sedimentary basins to assist with the search for hydrocarbons (Lines 1992).

Although the Advisory Committee on Commonwealth Mapping had agreed to adopt 1:250,000 scale in mid-1955, it was not until 1956 that RA Survey adopted metric scales (Coulthard-Clark 2000). NMC agreement followed in 1959, whereby both Commonwealth and State mapping agencies adopted decimal scales (National Mapping Council 1972). As the Commonwealth had few '4 mile' sheets to convert and the scale change was marginal, the conversion effort was minimal as Brown had forecast in 1951.

Along with the change to decimal scale, came the adoption of revised map symbology, a standardised edition numbering system (see Appendix A) and map sheet printing size. NMC agreement to an integrated set of national symbols (in line with SEATO standardisation agreements) came in 1958. Prior to this a British standard of 1906 had been used, and it formed the basis of the NMC Standard Topographic Map Symbols (STMS), first adopted by the NMC in 1948, amended in 1952 and published in February 1953.

The NMC Standard Topographic Map Symbols (STMS) revised to June 1962, recommended map symbols to be used in the production of topographic maps at medium and larger scales (National Mapping Council 1962). The June 1960, Royal Australian Survey Corps Manual of Map Specifications (published 1961 and as revised May 1962) also appears to have been a much used resource for the R502 map series (Royal Australian Survey Corps 1961).

While scale was 'decimalised', the existing '4 mile' sheet lines were retained as was the use of the 10,000 yard grid and, although not critical at the time, foot interval contours. The R502 series map sheet index at Appendix B shows the sheet lines for the series' 540 maps. In 1933, RA Survey had adopted a transverse Mercator projection and a corresponding yard grid (Clarke 1858 spheroid) which covered the whole of Australia in 8 zones. Each zone was 5 degrees of longitude wide with a half degree of common overlap. This was a simple projection with no provision for a scale factor and each zone's 'true origin' at 34 degrees south latitude. This projection was used for the R502 map series until replaced in 1966 when the Australian Map Grid (AMG) was adopted. After adoption of the AMG, almost half the R502 maps were overprinted with the 10,000 metre grid in cyan; refer to Appendix B.

Even though some of the specifications were still evolving, map production was moving ahead. Tennant Creek, the first sheet of National Mapping's COMMONWEALTH TOPOGRAPHIC SERIES 1:253,440, was published in September 1958 in four colours, and depicted relief by 250ft contours supplemented by hill-shading and spot heights. This was followed by black and white Provisional Editions, showing relief by spot heights alone. Forty-eight such sheets were published up to July 1961, when the series was superseded.

RA Survey had continued mapping after World War 2 at 4 miles to 1 inch scale (1:253,440), some of the sheets being reprints of the war-time editions. Between 1948 and 1958 ten contoured, full-colour sheets were produced under the title AUSTRALIA 1:253,440. Twelve black and white hachured sheets were also published between 1957 and 1961 under the title AUSTRALIA (PLANIMETRIC SERIES) 1:253,440. Following the 1959 decision to move to decimal scale, National Mapping embarked on a Planimetric Series at 1:250,000 scale and RA Survey a 1:250,000 scale Topographic Series (Tyson 1965); both series contributing to the AUSTRALIA 1:250,000, R502 program. Figure 4 summarises the medium scale topographic mapping scales used during the period 1907 to 1965.

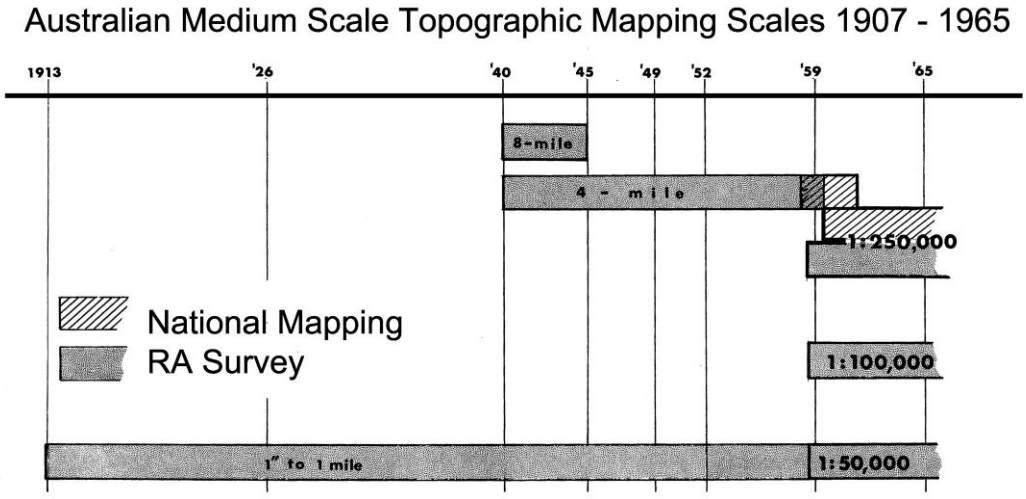

Figure 4 – Australian medium scale topographic mapping scales used during the period 1907 to 1965 (Tyson 1965).

The compilation methodology for the R502 series is illustrated in the photograph of a display panel of the time; refer Figures 5a & 5b. The four major production steps were: field work, horizontal control intensification, compilation and updating.

*Field work***:** In the field, astronomical observations to determine position (astrofixes) were taken and other identifiable control from reliable sources confirmed and accepted. These control points provided absolute horizontal position. Lines (1992) recorded that some 2,540 astrofixes were used for the R502 mapping program. Figure 6 shows the location of all astrofixes that were observed to 1965. Heights came through use of barometric heighting techniques (Biddle undated), (Division of National Mapping, undated)(Figure 7).

The table at Appendix B shows that, in addition to the survey control established by RA Survey and National Mapping, each of the State mapping agencies of the time contributed as well as the following organisations:

Australian Gulf Oil Company Ltd
Delhi Australia Petroleum Pty Ltd
Department of Interior
Hydrographic Office, Royal Australian Navy
Snowy Mountains Hydro Electric Authority
Country Roads Board, Victoria
Weapons Research Establishment, Department of Supply
Western Australian Petroleum Pty Ltd (WAPET).

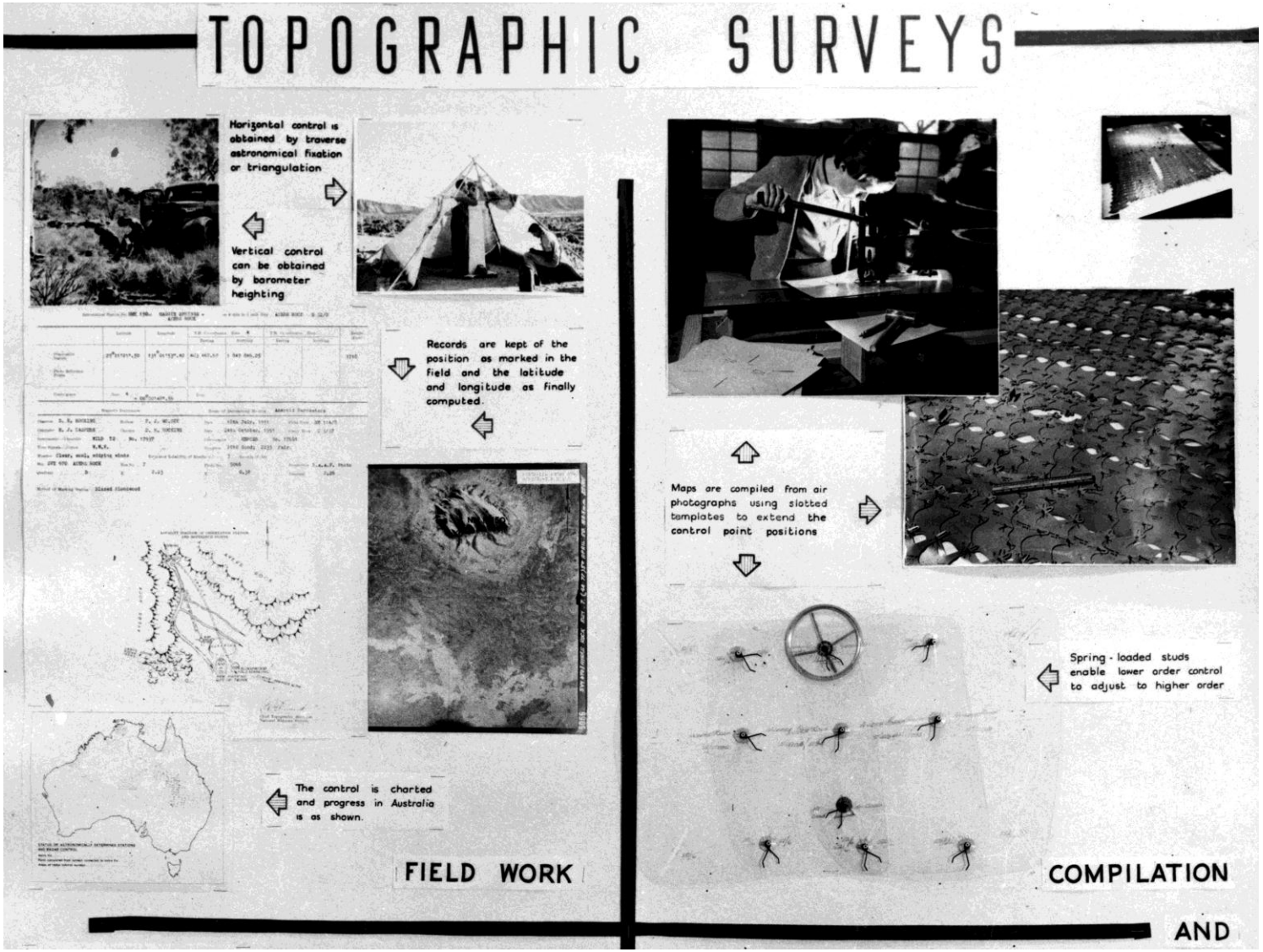

Figure 5a – 1:250,000 scale map compilation methodology – top section (courtesy O.J. Bobroff).

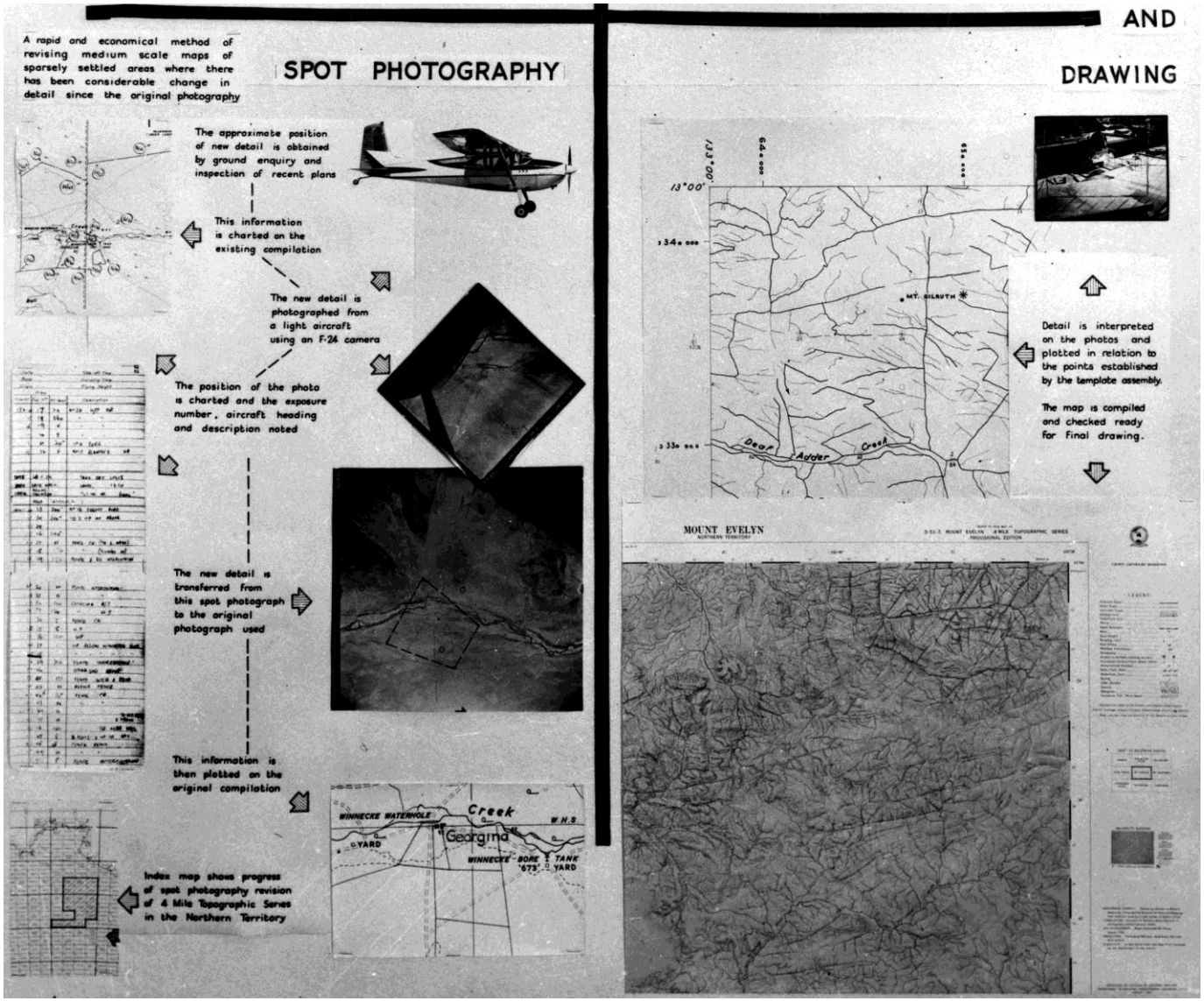

Figure 5b – 1:250,000 scale map compilation methodology – bottom section (courtesy O.J. Bobroff)

Figure 6 – Location of all astrofixes to 1965 (National Mapping Council 1966).

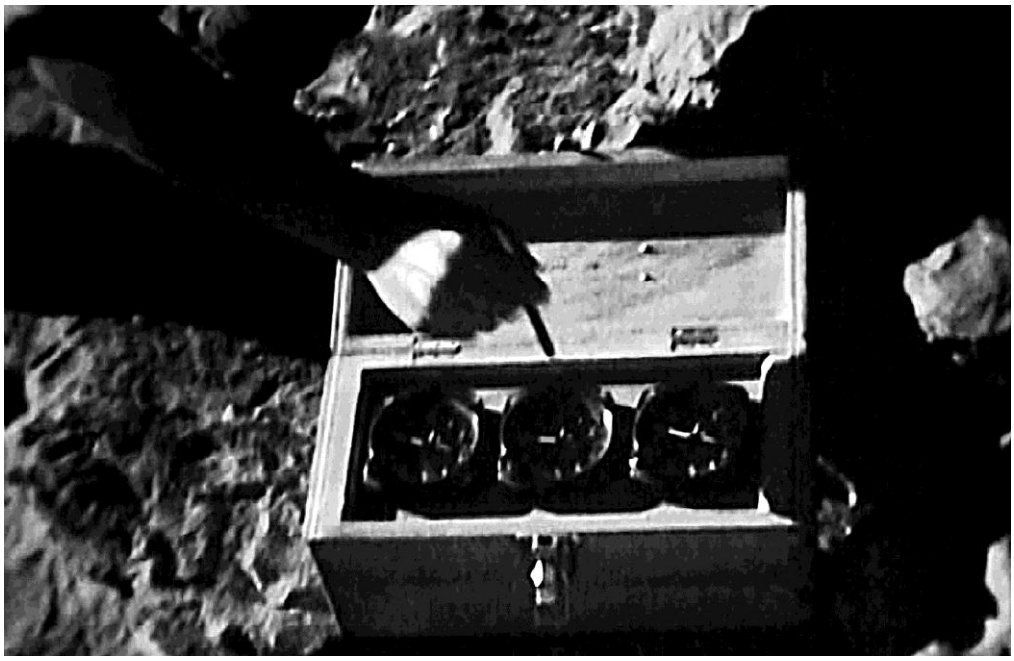

Figure 7 – Aircraft type barometer set (courtesy P. Hocking).

Figure 8 – Example of a large template assembly (8,300 templates approximately) covering an area about that of Victoria (courtesy P. Hocking).

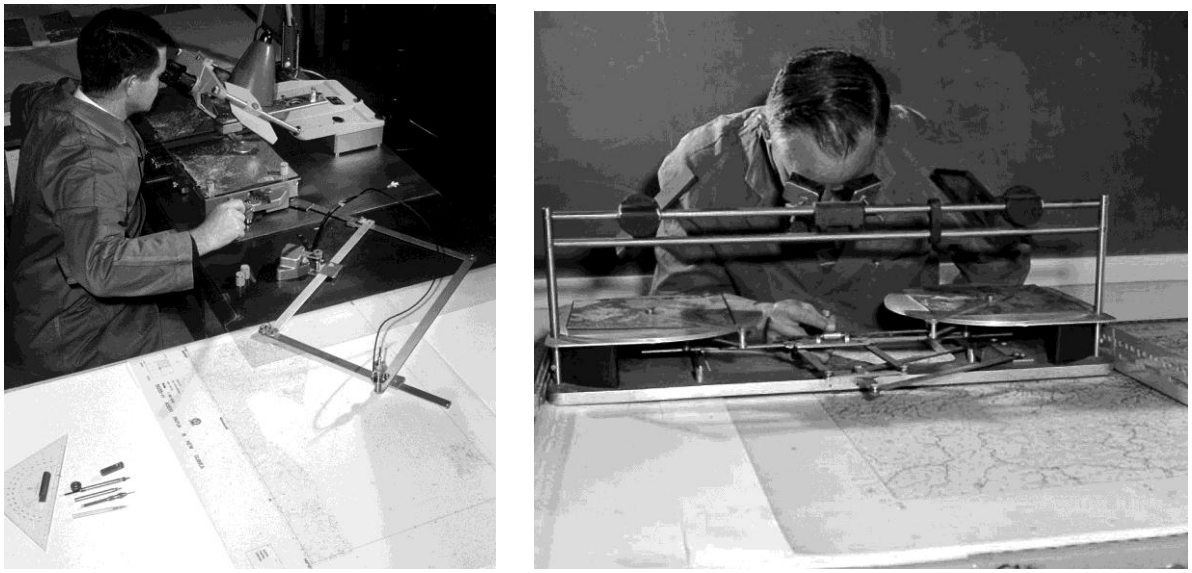

Figure 9 – Plotting from aerial photography using a Stereotope (Zeiss) and Radial Line Plotter (Kail) (courtesy D. Young).

MM62/205

DIVISION OF NATIONAL MAPPING

1:250,000 MAPPING

DEFINITION OF EDITIONS

1. PROVISIONAL EDITION

To be printed in three colours viz:

black	-	cultural features
dark blue	-	water features (line only)
brown	-	hill shading

and carry the usual warning note for users.

Notes

1.1 This edition is the result of office interpretation and compilation and is NOT field checked.

1.2 Sheets will be forwarded for nomenclature check immediately after publication.

2. FIRST EDITION

To be printed in four colours viz:

black	-	cultural features
dark blue	-	water features (line only)
brown	-	hill shading
red	-	road infills

and the warning note is to be omitted.

Notes

2.1 This edition has been field checked by spot photography and other methods.

2.2 Features of position approx., existence doubtful, and other anomalies shall, as far as possible, be clarified prior to publication.

2.3 Authorized nomenclature to be incorporated.

2.4 Vegetation and contours shall not be included in this edition.

3. SECOND AND SUBSEQUENT EDITIONS

To be printed in full colour viz:

black	-	cultural features
dark blue	-	water features (line)
light blue	-	water surfaces
brown	-	contours
red	-	road infills
green	-	vegetation

Notes

4.1 These editions are in fact STANDARD EDITIONS.

B.P. Lambert

(B.P. LAMBERT)
Director of National Mapping
9.8.62

Figure 10 - Copy of an August 1962 minute from B.P. Lambert, Director of National Mapping on *1:250,000 Mapping Definition of Editions*.

Horizontal control intensification: The slotted template technique was used to extend the field control to each photograph at a nominal scale of 1:46,500 (Hocking 1985). Hocking (1967) stated: 'within the Division of National Mapping slotted template assemblies have been completed for over two hundred 1:250,000 map areas in Australia covering nearly 1.25 million square miles [or nearly half the area of Australia]... where possible, templates have been assembled in large blocks and laid to the next line of control outside the area to be mapped, in order to obtain the best position from the ground control available' (Figure 8).

Compilation: After the control supplied by the slotted template process was used to position the aerial photographs in their correct relationship to the ground and to each other, the required detail was compiled using the (stereoscopic) plotting equipment of the time; for example the Stereotope and Radial Line Plotter are shown at Figure 9.

Updating: As production of the R502 series progressed, there was an increasing time lag between acquisition of the aerial photography and its use in map compilation. To help ensure currency of map detail before compilations went to the fair drawing and map printing stages, the compilations were updated using local knowledge and aerial inspections from light aircraft. If changes in detail were significant, photography (using an F24 camera) was acquired to allow the changes to be transferred to the compilations. Thus the detail was as up-to-date as possible when maps were printed.

A copy of an August 1962 minute from B.P. Lambert Director of National Mapping on *1:250,000 Mapping Definition of Editions* is shown at Figure 10. This minute described how National Mapping characterised editions in the R502 series, namely:

> *Provisional edition maps* were only printed in three colours (black, blue and brown) and carried the warning to users:
>
> > 'This map has not been completely examined on the ground and is issued at this stage in order to permit early distribution of topographic information'.
>
> *First edition maps* were printed in four colours, namely: black, red, brown and blue. Hill shading (Figure 11) was used to illustrate terrain along with spot heights. The majority of the National Mapping first edition maps also carried the above warning. Appendix B indicates that this warning was generally used on maps over areas with little cultural detail where field checking would not greatly improve content but delay release of the map.

RA Survey printed 124 maps with contours at 250ft intervals (Figure 12) with the colour green used as part of the layer tints (Figure 13) to indicate height and vegetation cover. These more complex printed maps were only produced where the required information was already available. Figures 16 and 18 show the agencies involved in R502 compilation and the areas of the contoured maps.

By 1960, RA Survey and National Mapping had advised the Advisory Committee on Commonwealth Mapping (ACOCM) that both organisations intended to generate 30 R502 map sheets per year. With such a rate of production of maps the completion of the R502 series mapping program was estimated to occur in 1969. The planned map volume was to be achieved by both organisations using minimal horizontal control and National Mapping employing contract assistance to meet its annual objective. Figure 14 shows the improved

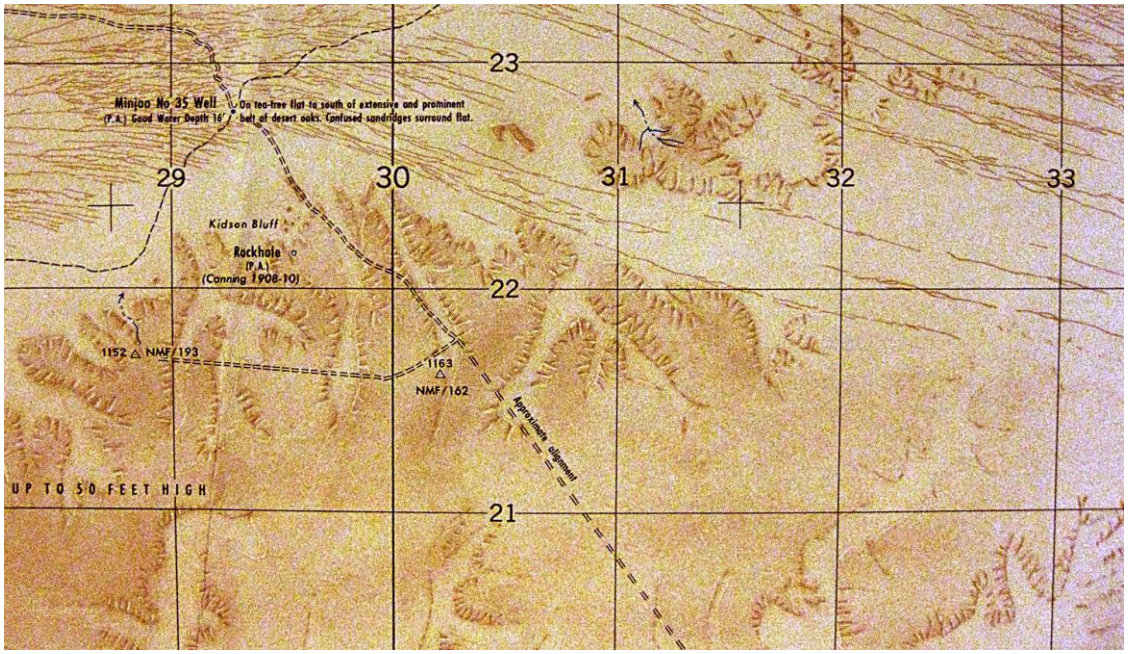

Figure 11 – Part of an R502 series map with hill shading and spot heights.

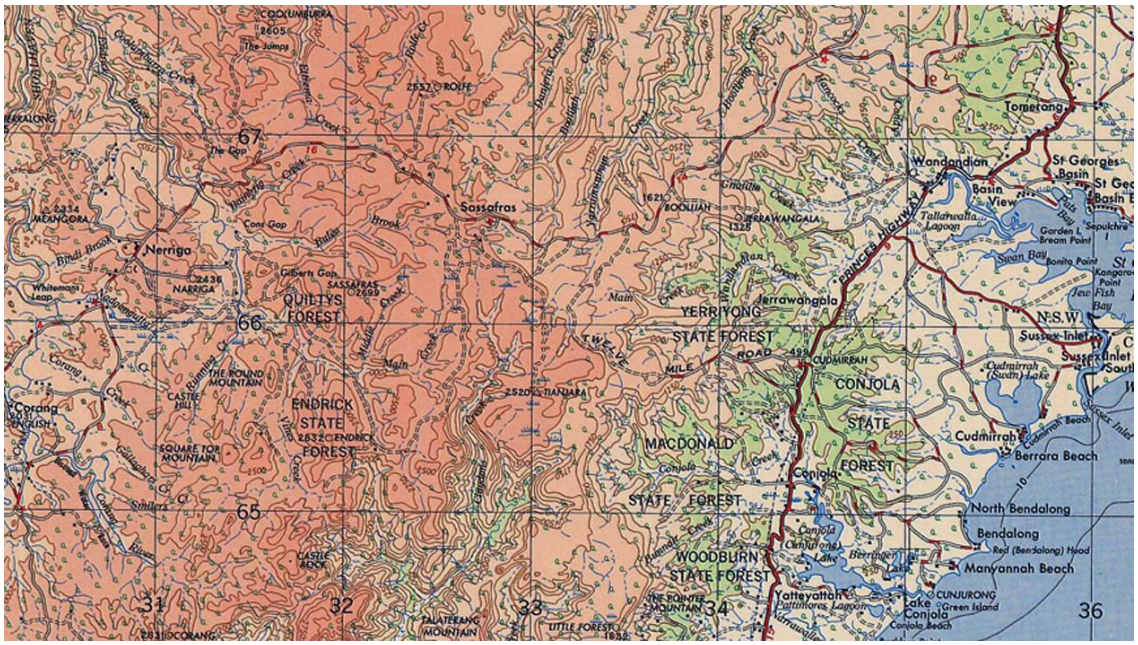

Figure 12 – Part of an R502 series map showing 250ft contours and layer tints.

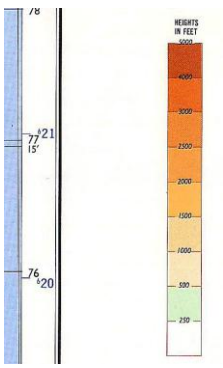

Figure 13 – Tint layer panel from an R502 series map.

Figure 14 – Showing the progress of the 1:250,000 scale mapping program at 5 yearly intervals from 1950 to 1965 as it gradually replaced the earlier "4 mile war-time" series; the escalation of progress in the early 1960s is clearly evident (National Mapping Council 1966).

progress after 1955 and the program escalation of the early 1960s. Interestingly, an 18 year mapping program was also envisaged at that time which would have incorporated new aerial photography and improved control and contours for the R502 map series. That vision was replaced in 1965 when the government agreed to the 1:100,000 scale NTMS program. From that program up-to-date 1:250,000 scale material was to be cartographically produced from the six 1:100,000 scale map sheets that comprised each 1:250,000 scale map sheet area.

R502 series map compilation was completed by 1966 but the last map did not roll off the printing press until 1968. Lines (1992) summarised the program as follows:

> 'When published in its entirety, there were 540 sheets in the series. The large majority were planimetric maps, with about 23% being contoured and published with layer tints by the Survey Corps. The layer tint range was 0-250-500-1000 feet and then at continuing 500 feet intervals. The contoured sheets were mostly in New South Wales and Queensland. There was a good deal of information available from larger scale Army

and State mapping in New South Wales and in north Queensland, including the Cape York Peninsula, where the Army's earlier priorities included 32 contoured sheets'.

Lines went on to say that the 1:250,000 scale R502 series map sheets were all published to Provisional or First Edition standards except three sheets in the Esperance area of Western Australia. These sheets (Ravensthorpe, Esperance and Mondrian Island) were produced as interim editions with first editions expected within the next twelve months. The 540 maps sheets in the R502 series were published as a joint effort by the two Commonwealth mapping agencies, with RA Survey publishing 300 and National Mapping 240 sheets. As far as can be established from records available, the base compilations and publishing for the 540 sheets were shared as shown in Table 2 below.

State/ Territory	Base compilations			Maps Published		
	State Sources	Army	Natmap	Army	Natmap	TOTAL
W.A.	92	59	28	129	50	179
N.T.	-	24	66	24	66	90
S.A.	14	19	35	22	46	68
Vic.	-	12	8	12	8	20
Tas.	8	-	-	8	-	8
N.S.W. & A.C.T.	-	45	9	45	9	54
Qld.	3	57	61	60	61	121
	117	216	207	300	240	540
% of Total	22%	40%	38%	56%	44%	

Table 2: Summary of R502 Series Compilations and Map Publication

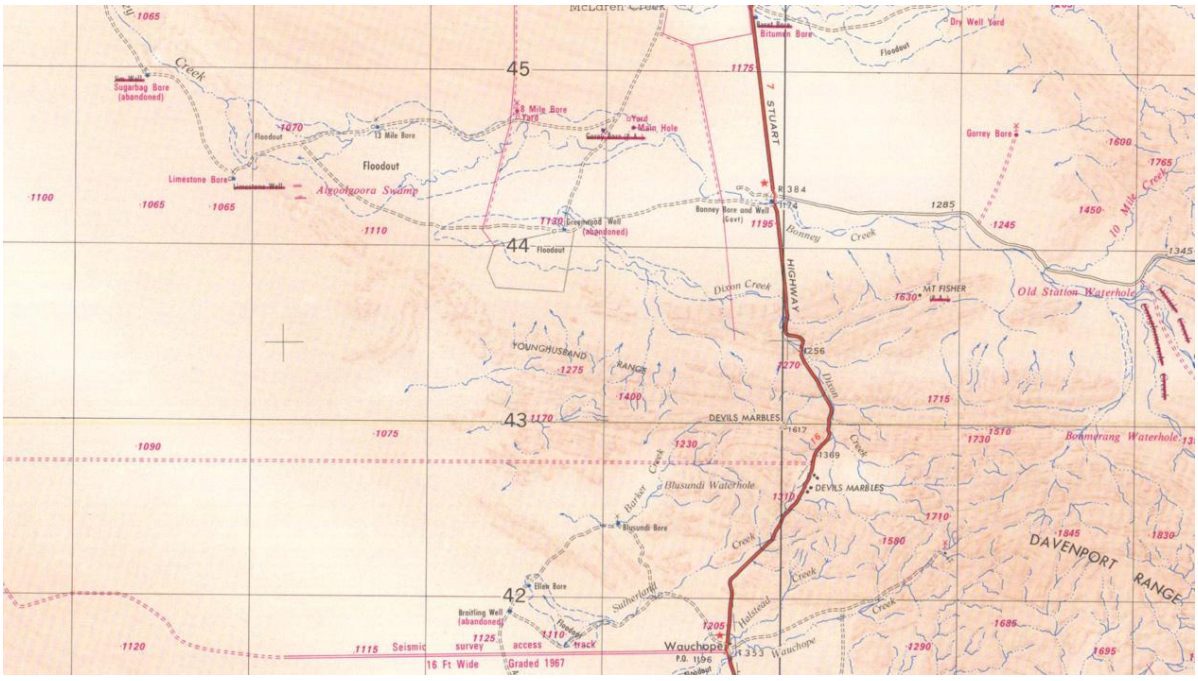

Figure 15 – Part of an R502 series map showing revised detail in magenta overprint.

Lines continued that in general the compilation material received from State sources required colour separated fair drawings and typesetting to be prepared by the publishing agency. RA Survey had a self-contained printing capacity more dedicated to map printing than was the Commonwealth Government Printer (that National Mapping used for its maps) and was able to accept a higher work load of the material coming from State sources.

Even as the last of the R502 map sheets was being printed, a program of map revision was being undertaken by National Mapping. Ground inspection by vehicle, augmented with information from local administrative and other sources, provided most of the new information to be included on the revised map sheets. The changes were overprinted in magenta, together with the following marginal note:

> 'Information in magenta is the result of a partial ground examination in 19(68 or 69). Positions are approximate'.

As can be seen in the section of the R502 map sheet shown in Figure 15, the revision was as extensive as the information gathered permitted. Only the early years' revisions were incorporated this way. Later revision information was used to modify the reproduction material before printing the revised map; this allowed all revised detail to be printed in its correct 'colours'.

National Mapping's R502 map revision program lasted until 1975 and resulted in a total of 88 map sheets being updated. Table 3 summarises the revision program (Division of National Mapping 1978). The revision program meant that the R502 map series was kept as up-to-date as possible until the National Topographic Map Series (NTMS) version was introduced in later years.

YEAR	NO. MAPS REVISED	WA	NT	SA	QLD	NSW	VIC
Pre-68	3 (M-3)	0	2	1	0	0	0
1968	3 (M-3)	0	0	0	1	0	2
1969	23 (M-8)	0	15	4	4	0	0
1970	1	0	1	0	0	0	0
1971	10	0	3	1	6	0	0
1972	10	0	4	2	3	0	1
1973	16	0	7	3	2	2	2
1974	16	0	7	2	4	1	2
1975	6	1	5	0	0	0	0
TOTALS	88	1	44	13	20	3	7

Table 3: Summary of National Mapping's R502 Map Revision Program.
Note: The "(M-3)" and "(M-8)" notations in the table indicate that in these years three sheets and eight sheets of the revised maps had the updates overprinted in magenta.

A set of R502 series maps was provided to the author by Geoscience Australia to assist in the preparation of this paper. These maps had been scanned and included all but seven of the 540 sheets in the series. Appendix B contains a table of specific details extracted from each of the map sheets provided. The information from the table was used to generate the following graphics which provide an informative visual summary of various aspects of the R502 series; refer to Figures 16 to 21.

Concluding remarks

Finalisation of the 1:250,000 scale R502 series of topographic maps meant that Australia had for the first time complete uniform map coverage. The series was at a scale that the majority of map users seeking such topographic information found useful. This outcome was a significant achievement for a relatively young nation with a small population and a vast geographic area. Nevertheless, it is a national information infrastructure milestone that appears to have passed with little formal acknowledgement of either the event or of the people who helped to achieve it.

The geodetic survey of Australia which provided substantial horizontal control for the R502 series mapping program was achieved some decades after its need was first mooted. However, this significant achievement received some recognition. It was acknowledged in the April 1974 Information Service Newsletter of the Directorate of Overseas Surveys of Great Britain in an article that stated: *the Australian geodetic network, a great part of it completed in ten years, must always be historically one of the survey wonders of the world*. Unfortunately it seems no such accolade was accorded the R502 map series.

Looking back over the past 100 years of topographic mapping in Australia, the completion of the R502 series of topographic maps was an enormous administratively, technically and logistically challenging task that must rank amongst the highest of Australia's national peace-time information infrastructure achievements. It is hoped that this paper has helped the reader to understand and appreciate the significance of the R502 map series and to belatedly acknowledge the many people who helped to bring it to fruition.

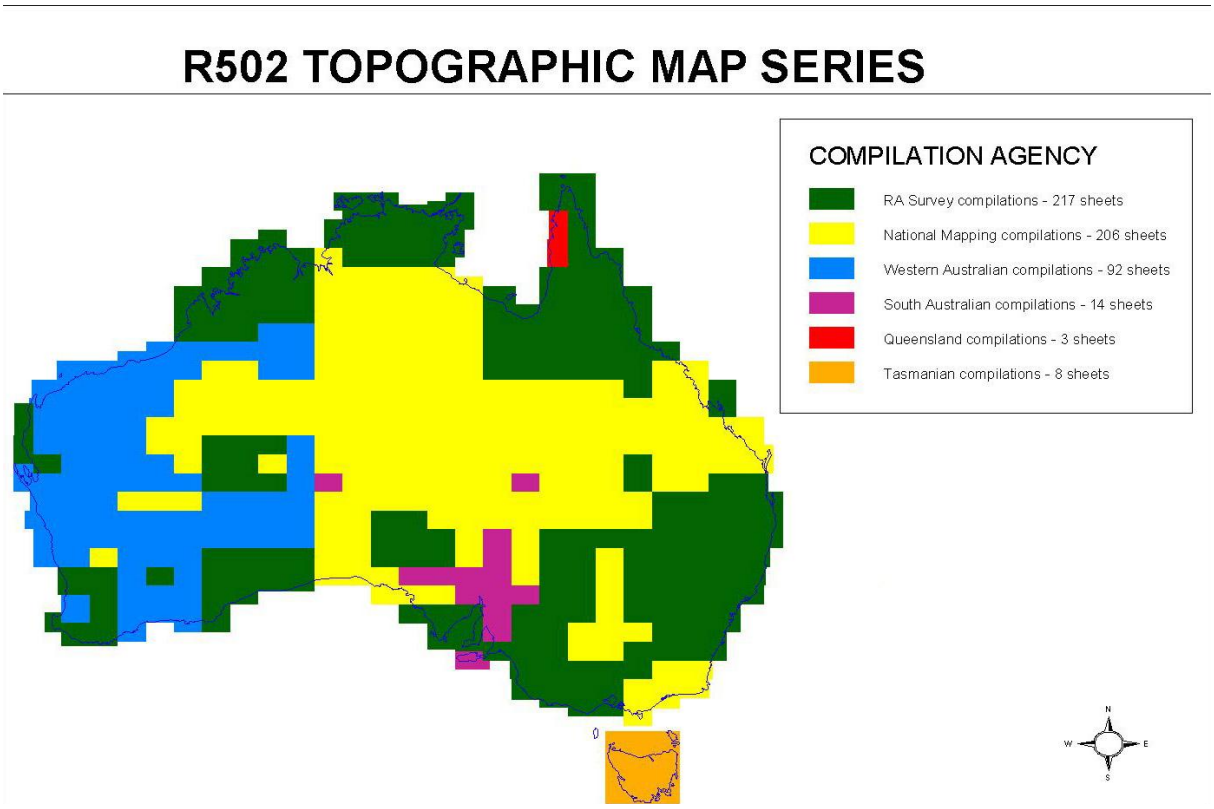

Figure 16 – R502 compilation by Agency.

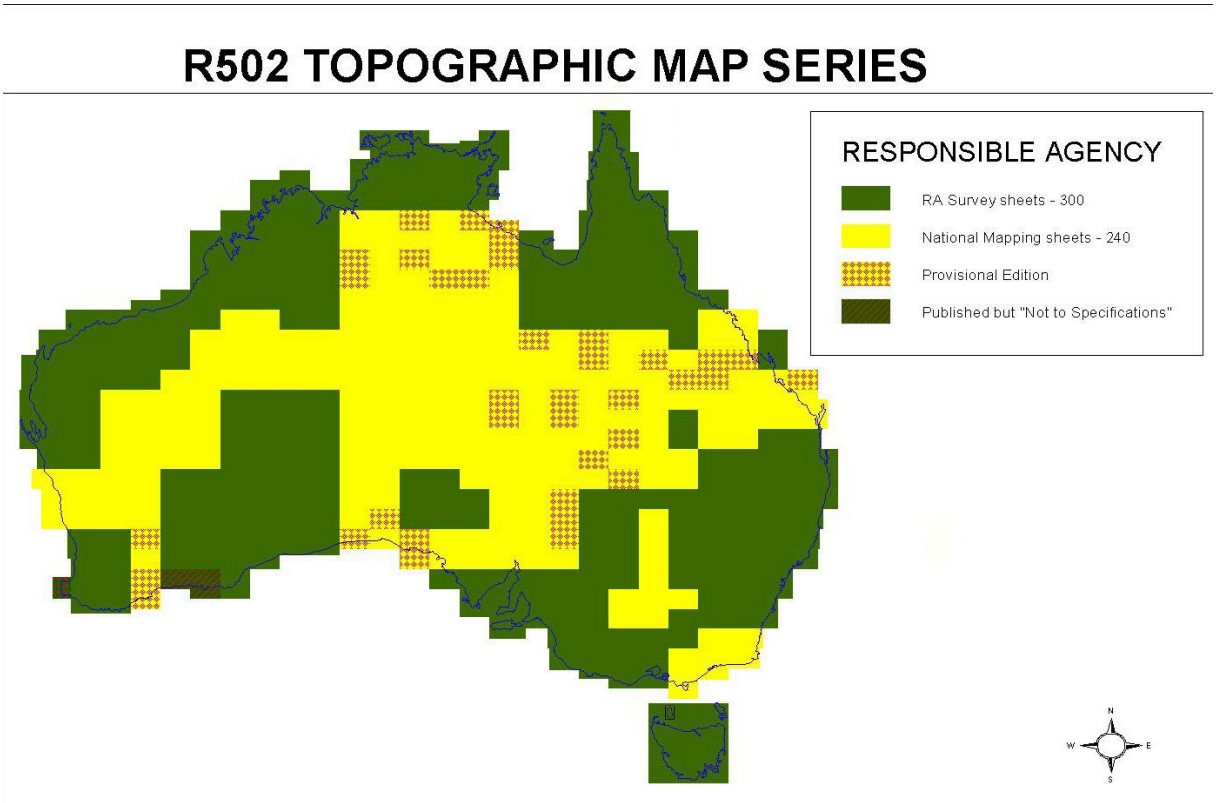

Figure 17 – R502 publication by Agency.

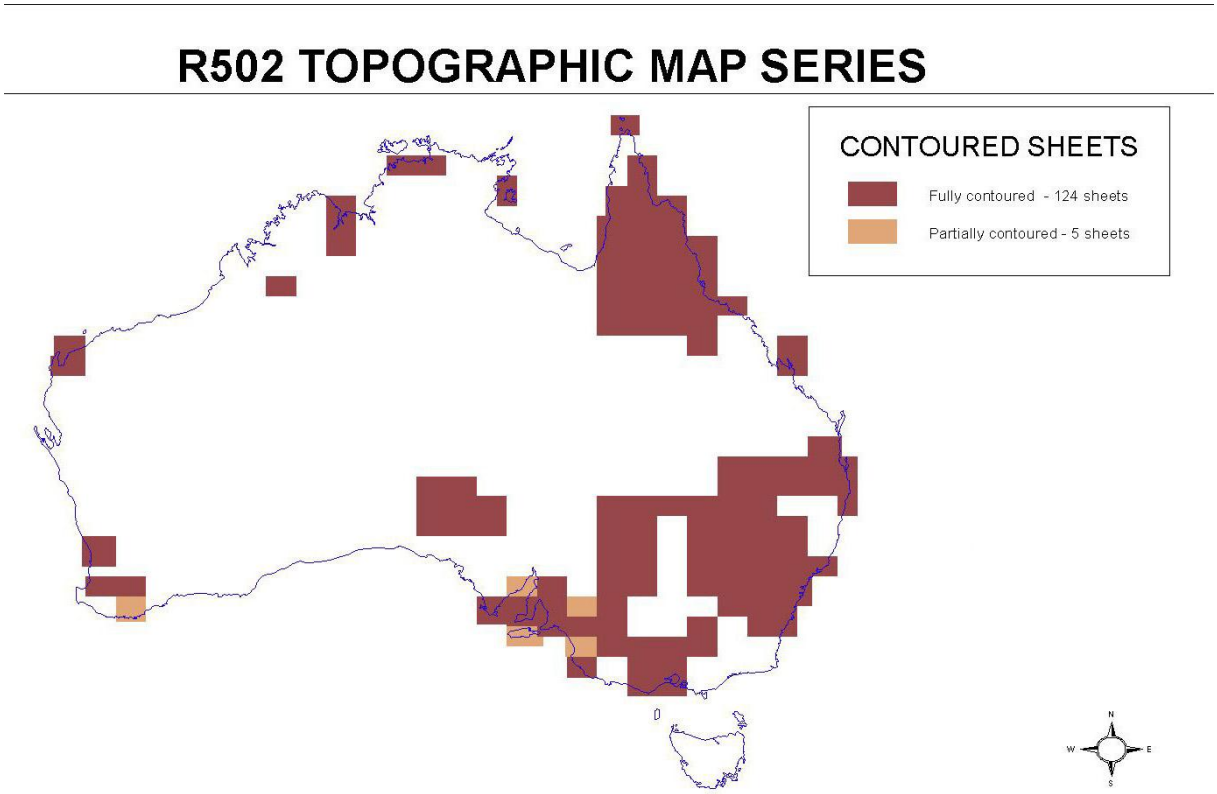

Figure 18 – R502 published maps with contours.

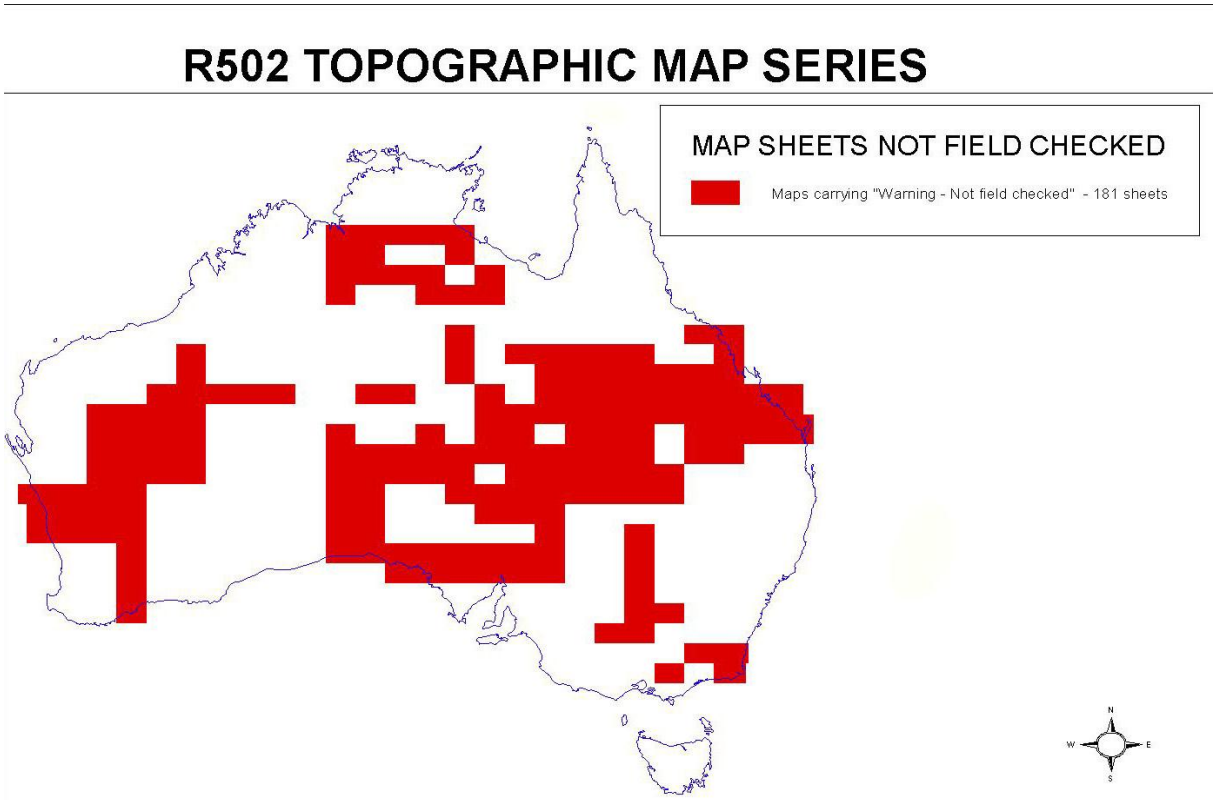

Figure 19 – R502 maps published carrying “Warning - not field checked”.

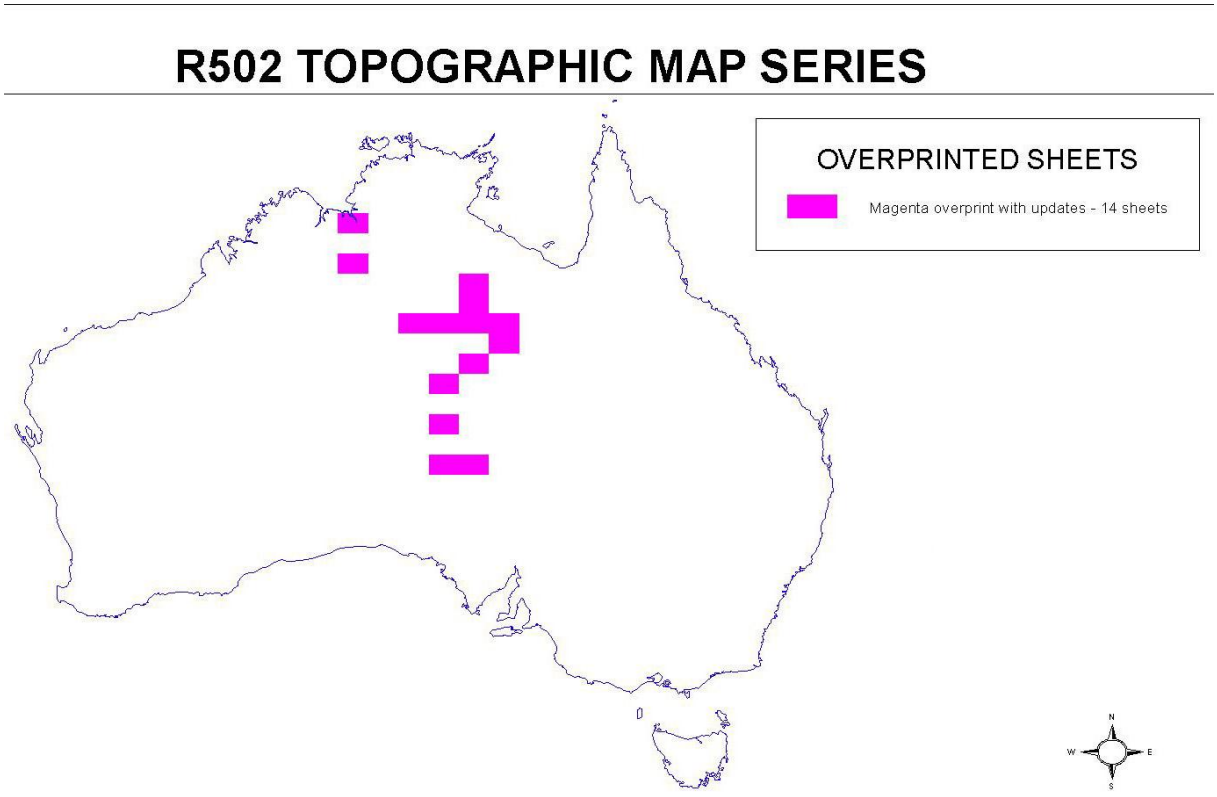

Figure 20 – R502 maps overprinted with updates in magenta.

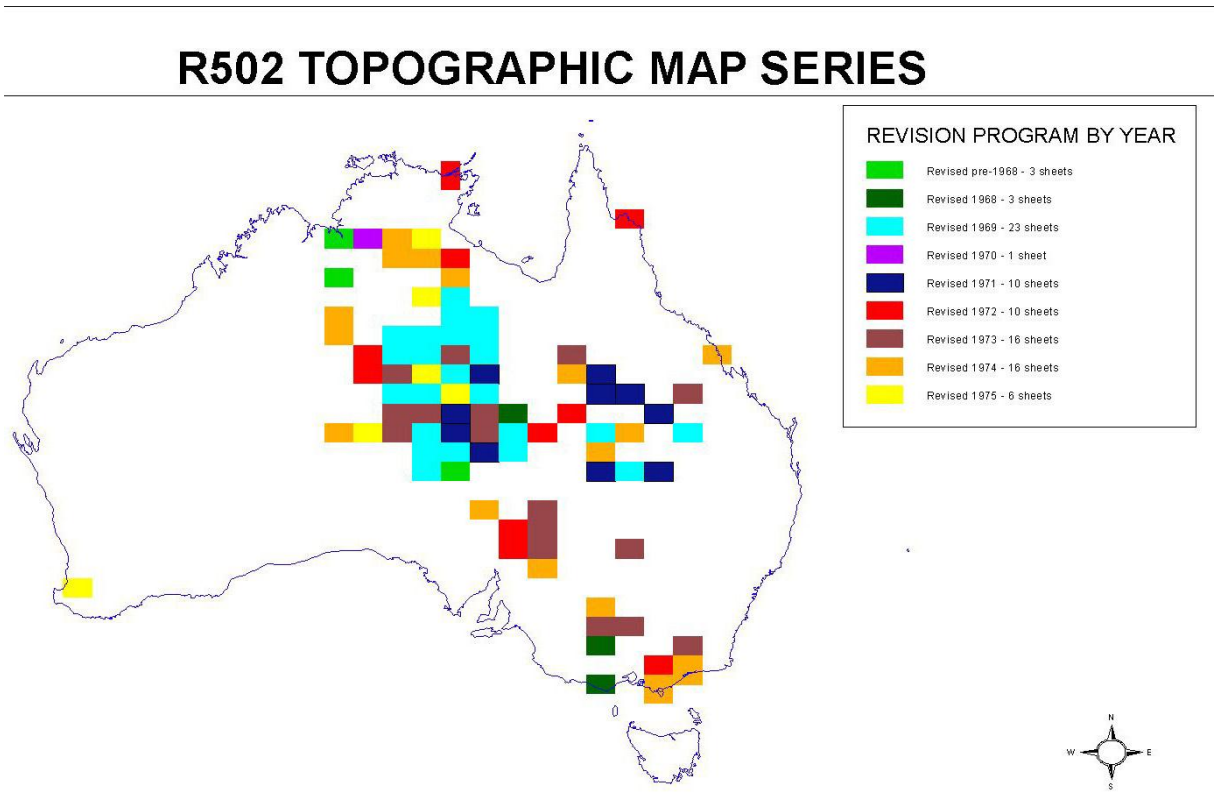

Figure 21 – R502 maps and year of revision.

Acknowledgements

I would like to acknowledge the late J.D. (Joe) Lines for his book Australia on Paper that provided a reliable time-line for the events described above and the summary referenced. Further, I acknowledge Mr Charlie Watson for the information at Appendix A and Ms Quentin Slade of the Map Section, National Library of Australia, for assisting me to gain access to B.T. (Trevor) Tyson's book, The Topographical Map Series of Australia. As well I thank Messrs John Knight, Graeme Larkin and Colin Kimber who kindly provided historical information from sources in Canberra. In addition I thank the numerous people who generously supplied the photographs and documents used to illustrate aspects of this paper. I also gratefully acknowledge Mr Laurie McLean's valuable contribution and comments on various draft versions of this paper. Geoscience Australia's kind permission to reproduce the map sections is appreciated and it is acknowledged that this material is released under the Creative Commons Attribution 2.5 Australia Licence.

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Appendix A

Military Series Designation

Around the end of World War 2 the military series designation was introduced.

There are four parts to the designation:-

major area covered
the scale range
sub area covered, and
sequence in that scale range.

Major Area covered

Represented by an alphabetic (A-Z) or numeric (1-9) symbol related to the specific country/region. For example, Australia is R, P.N.G. is T, Vietnam is L, Burma/Thailand is U, World is 1 etc.

The Scale range

Represented by a number (0-9) indicating the scale range:

5M and smaller	1
2M to 5M	2
2M to 510,000	3
510,000 to 255,000	4
255,000 to 150,000	5
150,000 to 70,000	6
70,000 to 35,000	7
larger than 35,000 excluding Town Plans	8
Town Plans all scales	9
Photomaps all scales	0

Sub Area covered

Represented by a number (0-9) indicating the area of coverage within the major area:

No sub area (the series covers the whole major area)	0
WA	1
NT	2
QLD	3
SA	4
VIC/NSW	5
TAS	6

Appendix A

Military Series Designation (continued)

Sequence in that Scale range

Represented by a number (1-9) indicating the numeric sequence in that scale range. For example first coverage would be 1, second coverage 2 etc.

Deciphering the R502 designation:

Using the explanation of the above elements R502 means:

R indicates the Australian area;

5 indicates a scale range between 1:150,000 and 1: 255,000,

0 indicates that there is no sub area (the series covers the whole major area), and

2 indicates that it is the second series in the 5th scale range.

Other examples:

Some other examples explaining the use of these designations are:

the old 4 mile to the inch series which preceded the 1:250,000, R502 series was R501;

the military Joint Operations Graphic (JOG) series 1501; the 1 indicating a world series;

a Queensland 1:100,000 is R631;

a Queensland 1:50,000 is R733 as the 1:63,360 (inch to a mile) and imperial 1:50,000 preceded this series;

a NSW 1:25,000 is R851 and a 1:25,000 orthophoto map of NSW is R051.

(Extracted & enlarged from personal communication – Watson, C.W.)

Appendix B

An Analysis of the R502 Series of Topographic Maps

The following table provides specific details on each of the map sheets comprising the R502 series.

The table was used to generate the graphics shown in the paper.

MAP NO.	MAP NAME	PROV	ONE	TWO	DATE (1)(2)	COMPILATION	A.PHOT	SVY, CONTROL	CONTOURED	AMG GRID	UPDATED	MARGINALIA	REVISED (3)
SC5215	BATHURST ISLAND		AAS		64	AAS/63	62	RAS					
SC5216	MELVILLE ISLAND		AAS		64	AAS/63	62	RAS		Y			
SC5313	COBURG PENINSULA		AAS		63	AAS/63	50	RAS		Y			
SC5314	JUNCTION BAY		AAS		61	AAS/61	50	RAS		Y			
SC5315	WESSEL ISLANDS		AAS		61	AAS/61	50	RAS		Y			
SC5316	TRUANT ISLAND		AAS		61	AAS/61	50	RAS					
SC5412	TORRES STRAIT		AAS		68	AAS/66	58	RAS	Y				
SC5415	JARDINE RIVER		AAS		68	AAS/66	58	RAS					
SC5416	ORFORD BAY		AAS		80	AAS/66	58	RAS		Y			
SD5111	BROWSE ISLAND		AAS		67	AAS/66	RAN/54	RAN	Y				
SD5112	MONTAGUE SOUND		AAS		63	AAS/62	49	RAS		Y			
SD5115	CAMDEN SOUND		AAS		63	AAS/63	49	RAS					
SD5116	PRINCE REGENT			AAS	67	AAS/63	49	RAS		Y			
SD5203	FOG BAY			AAS	81	AAS/60	50	RAS	Y	Y			
SD5204	DARWIN		AAS		NO MAP	AAS			Y				
SD5205	LONDONDERRY		AAS		61	AAS/61	49	RAS		Y			
SD5207	CAPE SCOTT			AAS	81	AAS/62	52	RAS		Y			
SD5208	PINE CREEK		AAS		64	AAS/63	48	RAS		Y			
SD5209	DRYSDALE		AAS		61	AAS/61	49	RAS					
SD5210	MEDUSABANKS		AAS		59	AAS/59	48	RAS	Y	Y			
SD5211	PORT KEATS		AAS		66	DNM/60	48	RAS/DNM		Y			
SD5212	FERGUSSON RIVER		AAS		65	AAS/65	62	RAS/DNM/NT		Y			
SD5213	ASHTON		AAS		61	AAS/61	49	RAS/DNM/WA					
SD5214	CAMBRIDGE GULF		AAS		60	AAS/59	48	RAS/DNM/WA	Y	Y			
SD5215	AUVERGNE		DNM		64	DNM/61	48	RAS/DNM/WA			67	WARNING	67
SD5216	DELAMERE		DNM		70	DNM/58	48	DNM				WARNING	70
SD5301	ALLIGATOR RIVER		AAS		80	AAS/62	50	RAS	Y	Y			
SD5302	MILINGIMBI		AAS		61	AAS/61	50	RAS		Y			
SD5303	ARNHEM BAY		AAS		72	AAS/62	50	RAS		Y			72
SD5304	GOVE		AAS		62	AAS/62	50	RAS		Y			
SD5305	MOUNT EVELYN		AAS		64	AAS/63	50	RAS		Y			
SD5306	MOUNT MARUMBA		AAS		61	AAS/61	50	RAS		Y			
SD5307	BLUE MUD BAY		AAS		61	AAS/61	50	RAS		Y			
SD5308	PORT LANGDON		AAS		61	AAS/61	50	RAS	Y				
SD5309	KATHERINE		AAS		65	AAS/63	62	RAS/DNM		Y			
SD5310	URAPUNGA		AAS		64	AAS/63	50	RAS		Y			
SD5311	ROPER RIVER		AAS		61	AAS/61	50	RAS		Y			
SD5312	CAPE BEATRICE		AAS		61	AAS/61	50	RAS		Y			
SD5313	LARRIMAH	DNM			74	DNM/59	50	RAS/DNM				WARNING	74
SD5314	HODGSON DOWNS		DNM		79	DNM/58	50	DNM		Y		WARNING	75
SD5315	MOUNT YOUNG	DNM			61	DNM/60	50	RAS/DNM				WARNING	
SD5316	PELLEW		DNM		78	DNM/61	50	DNM		Y		WARNING	
SD5403	WEIPA		AAS		65	QLD/63	57	RAS/DNM/QLD					
SD5404	CAPE WEYMOUTH		AAS		61	AAS/61	57	RAS	Y	Y			
SD5407	AURUKUN		AAS		65	QLD/63	57	RAS/DNM/QLD					
SD5408	COEN		AAS		80	AAS/61	58	RAS	Y	Y			
SD5411	HOLROYD		AAS		64	QLD/63	58	RAS	Y				
SD5412	EBAGOOLA		AAS		61	AAS/61	55	RAS	Y				
SD5415	RUTLAND PLAINS		AAS		62	AAS/62	58	RAS	Y	Y			

MAP NO.	MAP NAME	PROV	ONE	TWO	DATE (1)(2)	COMPILATION	A.PHOT	SVY, CONTROL	CONTOURED	AMG GRID	UPDATED	MARGINALIA	REVISED (3)
SD5416	HANN RIVER		AAS		60	AAS/59	55	RAS	Y	Y			
SD5509	CAPE MELVILLE		AAS		80	AAS/61	57	RAS	Y	Y			72
SD5513	COOKTOWN		AAS		81	AAS/64	60	RAS/QLD	Y	Y			
SE5016	BEDOUT ISLAND		AAS		67	WA/55	49	WA					
SE5102	PENDER		AAS		63	AAS/63	49	RAS/WA		Y			
SE5103	YAMPI		AAS		63	AAS/63	49	RAS		Y			
SE5104	CHARNLEY		AAS		61	AAS/61	49	RAS		Y			
SE5106	BROOME		AAS		63	AAS/63	49	RAS/WA		Y			
SE5107	DERBY		AAS		61	AAS/61	49	RAS		Y			
SE5108	LENNARD RIVER		AAS		63	AAS/63	49	RAS/WA		Y			
SE5110	LAGRANGE		AAS		64	AAS/63	49	WA/PET		Y			
SE5111	MOUNT ANDERSON		AAS		64	AAS/63	47	RAS/WA/PET		Y			
SE5112	NOONKANBAH		AAS		68	AAS/66	1:253K MAPS	RAS	Y	Y			
SE5113	MANDORA		AAS		67	WA/58	49	WA					
SE5114	MUNRO		AAS		67	WA/57	49	WA					
SE5115	MCLARTY HILLS		AAS		68	WA62	49	WA					
SE5116	CROSSLAND		AAS		68	WA/59	49	WA					
SE5201	MOUNT ELIZABETH		AAS		61	AAS/61	49	RAS/WA		Y			
SE5202	LISSADELL		AAS		60	AAS/60	48	RAS/WA	Y	Y			
SE5203	WATERLOO		DNM		73	DNM/58	48	RAS/DNM/WA				WARNING	
SE5204	VICTORIA RIVER DOWNS		DNM		74	DNM/60	50	DNM				WARNING	
SE5205	LANSDOWNE		AAS		61	AAS/61	49	RAS		Y			
SE5206	DIXON RANGE		AAS		60	AAS/60	48	RAS		Y			
SE5207	LIMBUNYA	DNM			65	DNM/63	49	DNM			67	WARNING	67
SE5208	WAVE HILL		DNM		68	DNM/64	48	DNM				WARNING	
SE5209	MOUNT RAMSAY		AAS		68	WA/54	47	DNM/WA		Y			
SE5210	GORDON DOWNS		AAS		68	WA/53	48	DNM/WA		Y			
SE5211	BIRRINDUDU	DNM			65	DNM/64	48	DNM				WARNING	
SE5212	WINNECKE CREEK			DNM	78	DNM/64	50	DNM		Y			
SE5213	MOUNT BANNERMAN		AAS		68	WA/59	49	WA					
SE5214	BILLILUNA		AAS		67	WA/57	49	WA					
SE5215	TANAMI		DNM		74	DNM/62	50	DNM/WA					74
SE5216	TANAMI EAST		DNM		61	DNM/62	50	DNM					
SE5301	DALY WATERS		DNM		74	DNM/64	63	RAS/DNM					74
SE5302	TANUMBIRINI		DNM		74	DNM/60	50	DNM					74
SE5303	BAUHINIA DOWNS		DNM		72	DNM/59	47	DNM				WARNING	72
SE5304	ROBINSON RIVER	DNM			74	DNM/59	47	DNM					
SE5305	NEWCASTLE WATER	DNM			65	DNM/64	63	RAS/DNM				WARNING	
SE5306	BEETALOO		DNM		76	DNM/64	63	DNM		Y		WARNING	
SE5307	WALLHALLOW		DNM		74	DNM/60	47	DNM					74
SE5308	CALVERT HILLS	DNM			65	DNM/61	47	RAS/DNM				WARNING	
SE5309	SOUTH LAKE WOOD		DNM		61	DNM/63	50	DNM/BMR					
SE5310	HELEN SPRINGS	DNM			75	DNM/59	47	DNM				WARNING	75
SE5311	BRUNETTE DOWNS	DNM			62	DNM/60	47	DNM			69	WARNING	69
SE5312	MOUNT DRUMMOND		DNM		68	DNM/59	47	DNM				WARNING	
SE5313	GREEN SWAMP WELL		DNM		61	DNM/61	50	DNM/BMR					
SE5314	TENNANT CREEK			DNM	76	DNM/62	47	RAS/DNM/NT		Y			
SE5315	ALROY		DNM		64	DNM/59	47	RAS/DNM			69		69
SE5316	RANKEN			DNM	79	DNM/59	47	DNM		Y			69

MAP NO.	MAP NAME	PROV	ONE	TWO	DATE (1)(2)	COMPILATION	A.PHOT	SVY, CONTROL	CONTOURED	AMG GRID	UPDATED	MARGINALIA	REVISED (3)
SE5401	MORNINGTON		AAS		62	AAS/62	51	RAS					
SE5402	CAPE VAN DIEMEN		AAS		62	AAS/62	51	RAS		Y			
SE5403	GALBRAITH		AAS		62	AAS/62	58	RAS	Y				
SE5404	WALSH		AAS		62	AAS/62	55	RAS	Y				
SE5405	WESTMORELAND		AAS		62	AAS/62	51	RAS					
SE5406	BURKETOWN		AAS		81	AAS/62	51	RAS		Y			
SE5407	NORMANTON		AAS		62	AAS/62	51	RAS	Y				
SE5408	RED RIVER		AAS		59	AAS/59	51	RAS/DNM/QLD	Y				
SE5409	LAWN HILL		AAS		63	AAS/63	47	RAS/DNM					
SE5410	DONORS HILL		AAS		63	AAS/63	51	RAS					
SE5411	CROYDON		AAS		62	AAS/62	52	RAS	Y				
SE5412	GEORGETOWN		AAS		61	AAS/61	51	RAS	Y	Y			
SE5413	CAMOOWEAL		AAS		61	AAS/61	47	RAS/DNM/QLD					
SE5414	DOBBYN		AAS		63	AAS/63	50	RAS/QLD					
SE5415	MILLUNGERA		AAS		62	AAS/62	51	RAS	Y				
SE5416	GILBERTON		AAS		61	AAS/61	51	RAS	Y	Y			
SE5501	MOSSMAN		AAS		81	AAS/65	60	RAS	Y	Y			
SE5502	CAIRNS		AAS		66	AAS/66	60	RAS	Y	Y			
SE5505	ATHERTON		AAS		81	AAS/65	51	RAS	Y	Y			
SE5506	INNISFAIL		AAS		82	AAS/63	61	RAS	Y	Y			
SE5509	EINASLEIGH		AAS		60	AAS/60	51	RAS	Y	Y			
SE5510	INGHAM		AAS		64	AAS/63	61	RAS	Y	Y			
SE5513	CLARKE RIVER		AAS		63	AAS/61	51	RAS	Y	Y			
SE5514	TOWNSVILLE		AAS		66	AAS/66	1:100K MAPS	RAS	Y				
SE5515	AYR		AAS		67	AAS/66	1:100K MAPS	RAS	Y				
SF4912	NINGALOO		AAS		58	AAS/57	49	WA	Y				
SF4916	MINILYA		AAS		66	AAS/51	49	WA					
SF5001	BARROW ISLAND		AAS		67	AAS/66	65	RAS					
SF5002	DAMPIER		AAS		68	WA/61	57	WA					
SF5003	ROEBOURNE		AAS		68	WA/56	49	WA		Y			
SF5004	PORT HEDLAND		AAS		68	WA/56	49	WA					
SF5005	ONSLOW		AAS		58	WA/57	49	WA	Y				
SF5006	YARRALOOLA		AAS		67	WA/60	57	WA					
SF5007	PYRAMID		AAS		67	WA/58	56	WA					
SF5008	MARBLE BAR		AAS		67	WA/58	47	WA					
SF5009	YANREY		AAS		58	WA/57	49	WA	Y	Y			
SF5010	WYLOO		AAS		68	WA/61	57	WA					
SF5011	MOUNT BRUCE			AAS	82	WA/61	57	WA		Y			
SF5012	ROY HILL		AAS		68	WA/60	57	WA					
SF5013	WINNING POOL		AAS		68	WA/67	64	RAS/WA/PET					
SF5014	EDMUND		AAS		68	WA/65	64	WA					
SF5015	TUREE CREEK		AAS		NO MAP	WA							
SF5016	NEWMAN			AAS	68	WA/61	58	WA					
SF5101	YARRIE		AAS		67	WA/58	53	WA					
SF5102	ANKETELL		AAS		68	WA/60	53	DNM/WA					
SF5103	JOANNA SPRING		DNM		63	DNM/63	53	DNM/WA					
SF5104	DUMMER		DNM		63	DNM/63	53	DNM/WA					
SF5105	NULLAGINE		AAS		67	WA/58	55	WA					
SF5106	PATERSON RANGE			DNM	82	DNM/65	53	DNM/WA		Y		WARNING	

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SF5107	SAHARA			DNM	79	DNM/63	53	DNM/WA		Y			
SF5108	PERCIVAL			DNM	63	DNM/63	53	DNM/WA					
SF5109	BALFOUR DOWNS		AAS		68	WA/60	57	WA					
SF5110	RUDALL			DNM	78	DNM/65	53	DNM/WA		Y		WARNING	
SF5111	TABLETOP		DNM		63	DNM/63	53	DNM/WA					
SF5112	URAL		DNM		63	DNM/63	53	DNM/WA					
SF5113	ROBERTSON			DNM	79	DNM/65	58	DNM/WA		Y		WARNING	
SF5114	GUNANYA		DNM		67	DNM/65	59	RAS/DNM/WA				WARNING	
SF5115	RUNTON		DNM		79	DNM/65	53	RAS/DNM/WA		Y		WARNING	
SF5116	MORRIS		DNM		79	DNM/65	53	RAS/DNM/WA		Y		WARNING	
SF5201	CORNISH		AAS		68	WA/59	53	WA					
SF5202	LUCAS		AAS		68	WA/58	50	WA					
SF5203	THE GRANITES		DNM		81	DNM/62	50	DNM/WA		Y			74
SF5204	MOUNT SOLITAIRE		DNM		63	DNM/62	50	DNM					
SF5205	HELENA		DNM		63	DNM/63	53	DNM/WA					
SF5206	STANSMORE			DNM	79	DNM/63	53	DNM/WA		Y			
SF5207	HIGHLAND ROCKS		DNM		63	DNM/62	50	DNM/WA					
SF5208	MOUNT THEO			DNM	72	DNM/62	50	DNM					72
SF5209	WILSON		DNM		63	DNM/63	53	DNM/WA					
SF5210	WEBB			DNM	79	DNM/63	53	DNM/WA		Y			
SF5211	LAKE MACKAY		DNM		63	DNM/62	57	DNM					
SF5212	MOUNT DOREEN		DNM		72	DNM/63	50	DNM/NT					72
SF5213	RYAN		DNM		79	DNM/65	53	RAS/WA		Y		WARNING	
SF5214	MACDONALD		DNM		62	DNM/63	59	DNM/WA					
SF5215	MOUNT RENNIE		DNM		78	DNM/61	57	DNM/WRE/WA		Y			
SF5216	MOUNT LIEBIG		DNM		76	DNM/59	50	DNM		Y		WARNING	
SF5301	LANDER RIVER		DNM		63	DNM/62	50	DNM			69		69
SF5302	BONNEY WELL		DNM		64	DNM/60	50	DNM/BMR/NT			69		69
SF5303	FREW RIVER		DNM		76	DNM/56	47	DNM		Y	69	WARNING	68
SF5304	AVON DOWNS		DNM		61	DNM/60	47	DNM			69		69
SF5305	MOUNT PEAKE			DNM	69	DNM/63	50	DNM/NT					69
SF5306	BARROW CREEK			DNM	69	DNM/60	50	DNM/NT/VCRB					69
SF5307	ELKEDRA			DNM	73	DNM/59	50	DNM				WARNING	73
SF5308	SANDOVER RIVER		DNM		62	DNM/62	49	DNM			69		69
SF5309	NAPPERBY		DNM		73	DNM/63	50	DNM					73
SF5310	ALCOOTA			DNM	75	DNM/63	50	DNM/NT					75
SF5311	HUCKITTA		DNM		64	DNM/58	50	DNM			69	WARNING	69
SF5312	TOBERMORY			DNM	71	DNM/59	55	DNM					71
SF5313	HERMANNSBURG			DNM	79	DNM/59	50	DNM		Y		WARNING	69
SF5314	ALICE SPRINGS			DNM	77	DNM/58	50	DNM/NT		Y	68		69
SF5315	ILLOGWA CREEK			DNM	75	DNM/59	50	DNM					75
SF5316	HAY RIVER			DNM	78	DNM/59	55	DNM		Y		WARNING	69
SF5401	MOUNT ISA		AAS		60	AAS/60	47	RAS/DNM/QLD					
SF5402	CLONCURRY		AAS		61	AAS/61	50	RAS/QLD		Y			
SF5403	JULIA CREEK		AAS		61	AAS/61	51	RAS/QLD	Y				
SF5404	RICHMOND		AAS		60	AAS/60	51	RAS/QLD	Y	Y			
SF5405	URANDANGI	DNM			67	DNM/64	47	RAS/DNM/DDOI				WARNING	
SF5406	DUCHESS		DNM		79	DNM/63	50	RAS/DNM/DOI		Y		WARNING	
SF5407	MC KINLAY	DNM			73	DNM/61	51	RAS/DNM/QLD				WARNING	73

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SF5408	MANUKA		DNM		68	DNM/61	51	RAS/DNM				WARNING	
SF5409	GLENORMISTON		DNM		NO MAP	DNM							
SF5410	BOULIA			DNM	79	DNM/57	51	RAS		Y		WARNING	
SF5411	MACKUNDA	DNM			74	DNM/61	51	RAS/DNM/DOI				WARNING	74
SF5412	WINTON		DNM		71	DNM/60	51	RAS/DNM				WARNING	71
SF5413	MOUNT WHELAN			DNM	78	DNM/61	51	RAS/DNM/DOI		Y			
SF5414	SPRINGVALE		DNM		68	DNM/60	51	RAS/DNM/QLD				WARNING	
SF5415	BRIGHTON DOWNS		DNM		79	DNM/61	51	RAS/DNM/DOI		Y		WARNING	
SF5416	MANEROO		DNM		71	DNM/61	51	DNM				WARNING	71
SF5501	HUGHENDEN		AAS		60	AAS/59	51	RAS/QLD	Y				
SF5502	CHARTERS TOWERS		AAS		64	AAS/63	61	RAS/DNM	Y	Y			
SF5503	BOWEN		DNM		67	DNM/63	60	RAS/DNM/QLD				WARNING	
SF5504	PROSERPINE		DNM		68	DNM/60	60	RAS/DNM/RAN				WARNING	
SF5505	TANGORIN		DNM		68	DNM/62	51	RAS/DNM/QLD				WARNING	
SF5506	BUCHANAN		AAS		66	AAS/65	62	DNM	Y	Y			
SF5507	MOUNT COOLON		DNM		71	DNM/61	47	DNM					
SF5508	MACKAY		DNM		74	DNM/63	60	RAS/DNM/QLD				WARNING	74
SF5509	MUTTABURRA	DNM			68	DNM/62	51	DNM/QLD				WARNING	
SF5510	GALILEE		DNM		79	DNM/62	52	DNM		Y		WARNING	
SF5511	CLERMONT	DNM			74	DNM/61	47	DNM				WARNING	
SF5512	ST LAWRENCE	DNM			65	DNM/63	60	RAS/DNM/QLD				WARNING	
SF5513	LONGREACH		DNM		71	DNM/62	51	DNM/QLD				WARNING	71
SF5514	JERICHO	DNM			68	DNM/63	51	DNM				WARNING	
SF5515	EMERALD	DNM			81	DNM/62	60	RAS/DNM		Y		WARNING	73
SF5516	DUARINGA		DNM		68	DNM/63	60	RAS/DNM/QLD				WARNING	
SF5605	PERCY ISLES		AAS		66	AAS/65	56	RAS/RAN	Y				
SF5609	PORT CLINTON			AAS	78	AAS/65	56	RAS/RAN	Y	Y			
SF5613	ROCKHAMPTON		DNM		74	DNM/62	60	DNM/QLD				WARNING	
SF5614	HERON ISLAND	DNM			67	DNM/66	64	RAN/GOIL				WARNING	
SG4904	QUOBBA		AAS		66	AAS/64	61	WA					
SG4908	SHARK BAY		AAS		67	WA/58	57	WA					
SG4912	EDEL		AAS		67	WA/65	57	WA					
SG5001	KENNEDY RANGE		AAS		68	WA/67	49	WA					
SG5002	MOUNT PHILLIPS		AAS		68	WA/52	52	WA					
SG5003	MOUNT EGERTON		DNM		68	WA/66	61	WA				WARNING	
SG5004	COLLIER		DNM		68	WA/63	58	WA				WARNING	
SG5005	WOORAMEL		AAS		67	AAS/53	52	WA					
SG5006	GLENBURGH		AAS		68	WA/52	52	WA					
SG5007	ROBINSON RANGE		DNM		67	WA/61	61	WA				WARNING	
SG5008	PEAK HILL			DNM	81	WA/58	58	WA		Y		WARNING	
SG5009	YARINGA		AAS		66	WA/65	52	WA					
SG5010	BYRO			AAS	81	WA/54	52	WA		Y			
SG5011	BELELE			DNM	80	WA/60	56	WA		Y		WARNING	
SG5012	GLENGARRY		DNM		80	WA/60	56	WA		Y		WARNING	
SG5013	AJANA			AAS	81	WA/54	53	WA		Y			
SG5014	MURGOO		AAS		68	WA/55	53	WA					
SG5015	CUE			DNM	81	WA/66	62	WA		Y		WARNING	
SG5016	SANDSTONE			DNM	79	DNM/66	60	WA		Y		WARNING	
SG5101	BULLER		DNM		66	DNM/65	58	DNM/WA				WARNING	

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SG5102	TRAINOR		DNM		68	DNM/65	59	RAS/DNM/WA				WARNING	
SG5103	MADLEY		AAS		62	AAS/62	60	RAS					
SG5104	WARRI		AAS		61	AAS/61	60	RAS/WA					
SG5105	NABBERU		DNM		67	WA/56	56	WA				WARNING	
SG5106	STANLEY		DNM		68	DNM/65	58	RAS/DNM/WA				WARNING	
SG5107	HERBERT		AAS		62	AAS/62	60	RAS/DNM					
SG5108	BROWNE		AAS		62	AAS/62	60	RAS/DNM					
SG5109	WILUNA			DNM	78	WA/56	56	WA		Y		WARNING	
SG5110	KINGSTON		DNM		67	WA/56	56	WA				WARNING	
SG5111	ROBERT		AAS		62	AAS/62	60	RAS/WA					
SG5112	YOWALGA		AAS		62	AAS/62	60	RAS					
SG5113	SIR SAMUEL			DNM	82	DNM/66	60	WA		Y		WARNING	
SG5114	DUKETON		DNM		68	DNM/66	60	WA				WARNING	
SG5115	THROSSELL		AAS		64	WA/63	60	RAS/WA					
SG5116	WESTWOOD		AAS		63	WA/63	60	WA					
SG5201	COBB		AAS		61	AAS/61	60	RAS/WA		Y			
SG5202	RAWLINSON		AAS		65	WA/60	59	WA					
SG5203	BLOODS RANGE			DNM	84	DNM/62	62	DNM/WA		Y			
SG5204	LAKE AMADEUS		DNM		80	DNM/59	50	DNM		Y			
SG5205	BENTLEY		AAS		62	DNM/62	59	RAS/DNM					
SG5206	SCOTT			AAS	82	WA/60	59	WA		Y			
SG5207	PETERMANN RANGES		DNM		79	DNM/59	55	DNM/WA		Y		WARNING	74
SG5208	AYERS ROCK		DNM		75	DNM/60	50	DNM					75
SG5209	TALBOT		AAS		62	AAS/62	59	RAS/DNM					
SG5210	COOPER		AAS		65	WA/60	59	WA		Y			
SG5211	MANN		DNM		68	SA/59	58	DNM/WA/SA/WRE				WARNING	
SG5212	WOODROFFE		DNM		79	DNM/65	64	RAS/DNM		Y		WARNING	
SG5213	LENNIS		AAS		64	WA/63	60	RAS/WA					
SG5214	WAIGEN		AAS		65	WA/63	60	DNM/WA					
SG5215	BIRKSGATE		DNM		66	DNM/65	58	DNM/WA				WARNING	
SG5216	LINDSAY			DNM	79	DNM/65	64	RAS/DNM		Y		WARNING	
SG5301	HENBURY		DNM		73	DNM/59	50	DNM					73
SG5302	RODINGA		DNM		73	DNM/61	60	DNM					73
SG5303	HALE RIVER		DNM		71	DNM/62	50	DNM					71
SG5304	SIMPSON DESERT NORTH	DNM			73	DNM/62	57	DNM/DOI				WARNING	73
SG5305	KULGERA		DNM		75	DNM/65	59	RAS/DNM					73
SG5306	FINKE			DNM	69	DNM/61	50	DNM		Y	68	WARNING	69
SG5307	MCDILLS		DNM		71	DNM/62	50	DNM/SA					71
SG5308	SIMPSON DESERT SOUTH	DNM			73	DNM/62	59	DNM/DOI				WARNING	73
SG5309	ALBERGA			DNM	79	DNM/66	65	RAS/DNM		Y		WARNING	
SG5310	ABMINGA		DNM		82	DNM/65	59	DNM		Y		WARNING	69
SG5311	DALHOUSIE		DNM		69	DNM/63	59	DNM				WARNING	69
SG5312	POOLOWANNA		DNM		71	DNM/63	59	DNM				WARNING	71
SG5313	EVERARD		DNM		76	DNM/65	64	RAS/DNM		Y		WARNING	
SG5314	WINTINNA		DNM		66	DNM/65	60	RAS/DNM			68	WARNING	69
SG5315	OODNADATTA		DNM		68	DNM/63	58	DNM/SA			67	WARNING	69
SG5316	NOOLYEANA			DNM	76	DNM/64	60	DNM/SA		Y			
SG5401	BEDOURIE		DNM		68	DNM/61	58	DNM/DOI/SA				WARNING	68
SG5402	MACHATTIE	DNM			68	DNM/63	58	DNM/DOI/SA/DELHI				WARNING	

MAP NO.	MAP NAME	PROV	ONE	TWO	DATE (1)(2)	COMPILATION	A.PHOT	SVY, CONTROL	CONTOURED	AMG GRID	UPDATED	MARGINALIA	REVISED (3)
SG5403	CONNEMARA		DNM		72	DNM/61	58	DNM				WARNING	72
SG5404	JUNDAH	DNM			68	DNM/62	51	DNM				WARNING	
SG5405	BIRDSVILLE		DNM		69	DNM/62	58	DNM/DOI				WARNING	69
SG5406	BETOOTA	DNM			81	DNM/62	58	DNM/DOI/SA/DELHI		Y			72
SG5407	CANTERBURY		DNM		78	DNM/62	58	DNM/DELHI		Y		WARNING	
SG5408	WINDORAH		DNM		69	DNM/62	58	DNM/DELHI				WARNING	69
SG5409	PANDIE PANDIE		DNM		69	DNM/63	58	DNM/SA				WARNING	69
SG5410	CORDILLO		DNM		68	SA/58	58	DNM				WARNING	
SG5411	BARROLKA		DNM		78	DNM/62	58	DNM/DELHI		Y		WARNING	
SG5412	EROMANGA	DNM			74	DNM/62	58	DNM/DELHI				WARNING	74
SG5413	GASON		DNM		78	DNM/64	60	DNM/SA		Y		WARNING	
SG5414	INNAMINCKA			DNM	80	DNM/65	63	DNM/SA/DELHI		Y		WARNING	
SG5415	DURHAM DOWNS	DNM			66	DNM/64	48	DNM/DELHI				WARNING	
SG5416	THARGOMINDAH		DNM		71	DNM/64	48	RAS/DNM				WARNING	71
SG5501	BLACKALL		DNM		78	DNM/61	51	DNM/QLD		Y		WARNING	
SG5502	TAMBO		DNM		71	DNM/63	53	DNM/QLD				WARNING	71
SG5503	SPRINGSURE		DNM		68	DNM/63	62	RAS/DNM				WARNING	
SG5504	BARALABA		DNM		67	DNM/63	61	DNM/QLD				WARNING	
SG5505	ADAVALE		DNM		79	DNM/61	51	DNM/QLD		Y		WARNING	74
SG5506	AUGATHELLA		AAS		66	AAS/65	64	DNM/QLD					
SG5507	EDDYSTONE		DNM		69	DNM/63	60	DNM/QLD				WARNING	69
SG5508	TAROOM		DNM		66	DNM/64	61	DNM/QLD				WARNING	
SG5509	QUILPIE		DNM		76	DNM/63	52	DNM		Y		WARNING	
SG5510	CHARLEVILLE		AAS		65	AAS/64	54	QLD		Y			
SG5511	MITCHELL		DNM		66	DNM/64	60	DNM/QLD				WARNING	
SG5512	ROMA		DNM		68	DNM/64	60	DNM/QLD				WARNING	
SG5513	TOOMPINE		DNM		69	DNM/62	52	RAS/DNM		Y		WARNING	69
SG5514	WYANDRA		DNM		71	DNM/63	52	RAS/DNM		Y		WARNING	71
SG5515	HOMEBOIN		AAS		66	AAS/66	63	DNM/QLD	Y				
SG5516	SURAT		AAS		67	AAS/66	63	DNM/QLD	Y	Y			
SG5601	MONTO		DNM		68	DNM/64	60	DNM/QLD				WARNING	
SG5602	BUNDABERG		DNM		68	DNM/65	62	RAS/DNM/RAN				WARNING	
SG5603	FRASER ISLAND		DNM		67	DNM/66	58	RAS				WARNING	
SG5605	MUNDUBBERA		DNM		67	DNM/62	60	DNM/QLD				WARNING	
SG5606	MARYBOROUGH		DNM		77	DNM/65	62	QLD		Y		WARNING	
SG5607	WIDE BAY		DNM		67	DNM/66	58	RAS				WARNING	
SG5609	CHINCHILLA		AAS		68	AAS/66	63	RAS/DNM		Y			
SG5610	GYMPIE		AAS		68	AAS/68	1:253K MAPS	RAS	Y	Y			
SG5613	DALBY		AAS		68	AAS/68	63	RAS/DNM	Y	Y			
SG5614	IPSWICH		AAS		68	AAS/68	1:253K MAPS	RAS	Y	Y			
SG5615	BRISBANE		AAS		68	AAS/68	1:253K MAPS	RAS	Y				
SH5001	GERALDTON		DNM		81	WA/62	62	RAS/WA/RAN		Y		WARNING	
SH5002	YALGOO			DNM	79	WA/64	58	WA		Y		WARNING	
SH5003	KIRKALOCKA			DNM	80	WA/66	62	WA		Y		WARNING	
SH5004	YOUANMI			DNM	79	WA/64	60	WA		Y		WARNING	
SH5005	DONGARA		DNM		68	WA/66	60	RAS/DNM/WA				WARNING	
SH5006	PERENJORI			DNM	79	WA/65	58	WA		Y		WARNING	
SH5007	NINGHAN		DNM		68	WA/66	62	WA				WARNING	
SH5008	BARLEE			DNM	79	WA/63	52	WA		Y		WARNING	

MAP NO.	MAP NAME	PROV	ONE	TWO	DATE (1)(2)	COMPILATION	A.PHOT	SVY, CONTROL	CONTOURED	AMG GRID	UPDATED	MARGINALIA	REVISED (3)
SH5009	HILL RIVER		DNM		68	WA/66	60	RAS/WA				WARNING	
SH5010	MOORA		DNM		68	WA/66	59	WA				WARNING	
SH5011	BENCUBBIN			DNM	79	DNM/66	62	WA		Y		WARNING	
SH5012	JACKSON		DNM		67	WA/52	52	WA				WARNING	
SH5014	PERTH		AAS		68	AAS/68	1:253K MAPS	RAS	Y	Y			
SH5015	KELLERBERRIN		AAS		67	AAS/66	65	RAS/WA					
SH5016	SOUTHERN CROSS	DNM			68	WA/67	52	WA				WARNING	
SH5101	LEONORA		AAS		82	WA/63	59	DNM/WA		Y			
SH5102	LAVERTON		AAS		68	WA/64	59	RAS/WA					
SH5103	RASON		AAS		64	WA/63	61	WA					
SH5104	NEALE		AAS		64	WA/63	60	WA					
SH5105	MENZIES		AAS		81	WA/62	59	RAS/DNM/WA		Y			
SH5106	EDJUDINA			AAS	81	WA/64	59	WA		Y			
SH5107	MINIGWAL		AAS		64	WA/63	61	WA					
SH5108	PLUMRIDGE		AAS		64	WA/63	61	WA					
SH5109	KALGOORLIE		AAS		68	WA/67	49	RAS/DNM/WA		Y			
SH5110	KURNALPI		AAS		68	WA/56	52	RAS/WA		Y			
SH5111	CUNDEELEE		AAS		64	AAS/64	61	RAS/WA					
SH5112	SEEMORE		AAS		64	AAS/64	61	WA					
SH5113	BOORABBIN		AAS		NO MAP	AAS							
SH5114	WIDGIEMOOLTHA		AAS		68	WA/56	55	WA					
SH5115	ZANTHUS		AAS		64	AAS/64	61	RAS/WA					
SH5116	NARETHA		AAS		65	AAS/63	61	RAS					
SH5201	VERNON		AAS		64	WA/61	61	WA					
SH5202	WANNA		AAS		65	WA/63	61	DNM/WA					
SH5203	NOORINA		DNM		67	DNM/65	62	DNM				WARNING	
SH5204	WELLS		DNM		66	DNM/65	47	DNM				WARNING STAMP	
SH5205	JUBILEE		AAS		64	WA/63	60	WA					
SH5206	MASON		AAS		64	WA/63	60	DNM/WA					
SH5207	WYOLA		DNM		66	DNM/65	62	DNM				WARNING STAMP	
SH5208	MAURICE			DNM	79	DNM/65	59	RAS/DNM		Y		WARNING	
SH5209	LOONGANA		AAS		64	AAS/63	61	RAS/WA					
SH5210	FORREST		AAS		64	AAS/63	61	RAS/DNM/WA					
SH5211	COOK		DNM		76	DNM/64	62	RAS/DNM		Y		EXTRA WARNING	
SH5212	OOLDEA	DNM			66	DNM/65	60	DNM				WARNING	
SH5213	MADURA			AAS	66	AAS/63	61	RAS/DNM					
SH5214	EUCLA		AAS		NO MAP	AAS							
SH5215	COOMPANA	DNM			67	DNM/65	63	DNM				EXTRA WARNING	
SH5216	NULLARBOR		DNM		79	DNM/65	62	DNM		Y		EXTRA WARNING	
SH5301	GILES		AAS		65	AAS/64	62	RAS/DOI/WRE	Y				
SH5302	MURLOOCOPPIE		AAS		74	AAS/60	47	RAS	Y	Y			
SH5303	WARRINA		DNM		66	DNM/65	64	RAS/DNM/SA				WARNING	
SH5304	LAKE EYRE			DNM	79	DNM/65	64	RAS/DNM/SA		Y		WARNING	
SH5305	TALLARINGA		AAS		65	AAS/64	49	RAS/DOI	Y				
SH5306	COOBER PEDY		AAS		66	AAS/65	62	RAS/DNM/DOI	Y	Y			
SH5307	BILLA KALINA			AAS	82	AAS/65	62	RAS/DNM/SA	Y	Y			
SH5308	CURDIMURKA		DNM		82	DNM/65	61	DNM/SA		Y		WARNING	74
SH5309	BARTON		AAS		61	AAS/61	49	RAS/DOI	Y				
SH5310	TARCOOLA		AAS		60	AAS/60	49	RAS/DOI	Y				

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SH5311	KINGOONYA		AAS		67	AAS/66	61	RAS/DNM/SA	Y				
SH5312	ANDAMOOKA			DNM	81	DNM/66	58	RAS/DNM/SA		Y			
SH5313	FOWLER	DNM			67	DNM/64	63	DNM/SA				WARNING	
SH5314	CHILDARA		DNM		67	SA/62	59	DNM/SA				WARNING	
SH5315	GAIRDNER		DNM		67	SA/62	59	RAS/DNM/SA				WARNING	
SH5316	TORRENS			DNM	79	SA/62	58	RAS/SA		Y		WARNING	
SH5401	KOPPERAMANNA			DNM	77	DNM/65	63	DNM/SA/DELHI		Y		WARNING	
SH5402	STRZELECKI		DNM		65	DNM/65	63	DNM/SA/DELHI				WARNING	
SH5403	TICKALARA		DNM		79	DNM/64	48	RAS/DNM		Y		WARNING	
SH5404	BULLOO	DNM			65	DNM/64	48	RAS/DNM				WARNING	
SH5405	MARREE		DNM		68	SA/66	61	RAS/DNM				WARNING	
SH5406	CALLABONNA	DNM			73	DNM/64	60	DNM/SA				WARNING	73
SH5407	MILPARINKA		AAS		62	AAS/62	60	RAS/DNM	Y				
SH5408	URISINO		AAS		63	AAS/62	60	RAS	Y				
SH5409	COPLEY			DNM	80	SA/65	56	SA		Y			72
SH5410	FROME	DNM			73	DNM/65	59	DNM/SA				WARNING	73
SH5411	COBHAM LAKE		AAS		64	AAS/63	55	RAS/DNM	Y	Y			
SH5412	WHITE CLIFFS		AAS		65	AAS/64	55	DNM/RAS	Y				
SH5413	PARACHILNA			DNM	81	SA/62	56	SA		Y		WARNING	72
SH5414	CURNAMONA	DNM			73	DNM/64	59	DNM/SA				WARNING	73
SH5415	BROKEN HILL		AAS		81	AAS/63	54	RAS/DNM	Y	Y			
SH5416	WILCANNIA		AAS		65	AAS/64	55	RAS/DNM	Y				
SH5501	EULO		DNM		76	DNM/64	52	RAS/DNM		Y		WARNING	
SH5502	CUNNAMULLA		DNM		76	DNM/64	52	RAS/DNM		Y		WARNING	
SH5503	DIRRANBANDI		AAS		66	AAS/66	63	DNM/QLD	Y	Y			
SH5504	ST GEORGE		AAS		68	AAS/66	63	RAS/DNM/QLD	Y	Y			
SH5505	YANTABULLA		AAS		63	AAS/62	60	RAS	Y				
SH5506	ENNGONIA		AAS		62	AAS/62	51	RAS	Y				
SH5507	ANGLEDOOL		AAS		62	AAS/62	59	RAS	Y				
SH5508	MOREE		AAS		60	AAS/60	59	RAS/NSW	Y	Y			
SH5509	LOUTH		DNM		68	DNM/66	60	RAS/DNM				WARNING	
SH5510	BOURKE		AAS		66	AAS/65	1:63K MAPS	NSW	Y				
SH5511	WALGETT		AAS		68	AAS/66	59	RAS/NSW	Y				
SH5512	NARRABRI		AAS		81	AAS/66	58	RAS/NSW	Y	Y			
SH5513	BARNATO		DNM		80	DNM/65	59	RAS/DNM		Y		WARNING	73
SH5514	COBAR		AAS		66	AAS/65	52	NSW	Y				
SH5515	NYNGAN		AAS		69	AAS/66	61	RAS/NSW	Y				
SH5516	GILGANDRA		AAS		65	AAS/65	55	NSW	Y	Y			
SH5601	GOONDIWINDI		AAS		68	AAS/66	63	RAS/DNM/QLD	Y	Y			
SH5602	WARWICK			AAS	73	AAS/69	69	RAS/DNM/QLD	Y	Y			
SH5603	TWEED HEADS		AAS		68	AAS/67	1:63K MAPS	RAS/NSW	Y	Y			
SH5605	INVERELL		AAS		68	AAS/64	62	RAS/NSW		Y			
SH5606	GRAFTON		AAS		68	AAS/67	1:50K MAPS	RAS/NSW		Y			
SH5607	MACLEAN		AAS		67	AAS/66	64	RAS	Y	Y			
SH5609	MANILLA		AAS		67	AAS/66	58	RAS/NSW	Y	Y			
SH5610	DORRIGO		AAS		67	AAS/67	64	RAS/NSW		Y			
SH5611	COFFS HARBOUR		AAS		67	AAS/66	64	NSW	Y	Y			
SH5613	TAMWORTH		AAS		65	AAS/65	54	RAS/NSW	Y	Y			
SH5614	HASTINGS		AAS		67	AAS/66	1:63K MAPS	RAS/NSW					

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SI5002	PINJARRA		AAS		68	WA/68	65	WA					
SI5003	CORRIGIN		AAS		67	AAS/66	65	WA					
SI5004	HYDEN		DNM		68	WA/66	61	WA				WARNING	
SI5005	BUSSELTON	AAS			68	AAS/67	64	RAS/WA		Y			
SI5006	COLLIE			AAS	75	WA/75	1:100K MAPS	WA	Y	Y			75
SI5007	DUMBLEYUNG		AAS		68	AAS/66	65	RAS/DNM/WA	Y	Y			
SI5008	NEWDEGATE	DNM			68	WA/56	56	WA				WARNING	
SI5009	AUGUSTA		AAS		68	AAS/66	65	WA					
SI5010	PEMBERTON			AAS	81	AAS/66	65	RAS/WA		Y			
SI5011	MOUNT BARKER		AAS		68	AAS/67	65	RAS/WA	P			PARTIALLY CONTOURED	
SI5012	BREMER BAY	DNM			68	WA/66	65	WA				WARNING	
SI5014	IRWIN INLET		AAS		67	AAS/66	65	RAS/WA					
SI5015	ALBANY		AAS		68	AAS/65	66	RAS/WA	Y				
SI5101	LAKE JOHNSTON		AAS		68	WA/59	58	WA					
SI5102	NORSEMAN		AAS		68	WA/59	58	WA					
SI5103	BALLADONIA		AAS		65	AAS/64	61	RAS/WA					
SI5104	CULVER		AAS		65	AAS/63	61	RAS					
SI5105	RAVENSTHORPE	AAS			68	WA/67	57	WA				NOT TO SPECIFICATIONS	
SI5106	ESPERANCE	AAS			68	WA/67	56	RAS/WA				NOT TO SPECIFICATIONS	
SI5107	MALCOLM		AAS		68	AAS/66	62	RAS					
SI5110	MONDRAIN ISLAND	AAS			68	AAS/68	RAN/68	RAN				NOT TO SPECIFICATIONS	
SI5111	CAPE ARID		AAS		66	AAS/66	62	RAS					
SI5201	BURNABBIE		AAS		64	AAS/63	61	RAS					
SI5202	NOONAERA		AAS		64	AAS/63	61	RAS					
SI5301	NUYTS	DNM			66	DNM/65	58	DNM				WARNING	
SI5302	STREAKY BAY		DNM		67	DNM/66	64	DNM/SA				WARNING	
SI5303	YARDEA		DNM		67	DNM/66	59	DNM/SA				WARNING	
SI5304	PORT AUGUSTA			DNM	80	SA/65	54	SA		Y		WARNING	
SI5306	ELLISTON		AAS		68	AAS/66	66	RAS/SA					
SI5307	KIMBA		AAS		68	AAS/66	66	RAS/DNM/SA		Y			
SI5308	WHYALLA		AAS		68	AAS/66	66	RAS/DNM/SA/RAN	P	Y		PARTIALLY CONTOURED	
SI5311	LINCOLN		AAS		68	AAS/66	60	DNM/SA/RAN	Y	Y			
SI5312	MAITLAND		AAS		63	AAS/63	1:100K MAPS	SA	Y	Y			
SI5316	KINGSCOTE		AAS		68	SA/66	1:100K MAPS	SA/RAN	P	Y		PARTIALLY CONTOURED	
SI5401	ORRORO0			DNM	78	SA/64	58	SA		Y		WARNING	
SI5402	OLARY		DNM		74	SA/66	55	SA				WARNING	74
SI5403	MENINDEE		AAS		66	AAS/65	52	RAS/DNM	Y				
SI5404	MANARA		AAS		66	AAS/65	60	RAS/DNM	Y				
SI5405	BURRA		AAS		68	SA/66	55	RAS/SA	Y	Y			
SI5406	CHOWILLA		AAS		66	AAS/65	58	RAS/SA		Y			
SI5407	ANA BRANCH		AAS		60	AAS/60	54	RAS	Y				
SI5408	POONCARIE		AAS		61	AAS/61	54	RAS	Y				
SI5409	ADELAIDE		AAS		68	SA/66	65	RAS/SA	Y	Y			
SI5410	RENMARK		AAS		68	AAS/66	65	RAS/SA	P	Y		PARTIALLY CONTOURED	
SI5411	MILDURA		AAS		NO MAP	AAS			Y	Y			
SI5412	BALRANALD		DNM		68	DNM/66	64	RAS/DNM					74
SI5413	BARKER		AAS		68	AAS/66	64	RAS/SA	Y	Y			
SI5414	PINNAROO		AAS		67	AAS/66	65	RAS/SA	Y	Y			
SI5415	OUYEN		AAS		66	AAS/65	63	RAS	Y	Y			

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SI5416	SWAN HILL		DNM		73	DNM/66	64	RAS/DNM				WARNING	73
SI5501	IVANHOE		DNM		78	DNM/65	60	RAS/DNM		Y		WARNING	
SI5502	NYMAGEE		AAS		65	AAS/63	57	NSW	Y				
SI5503	NARROMINE		AAS		60	AAS/58	58	NSW	Y	Y			
SI5504	DUBBO		AAS		60	AAS/58	45	RAS/NSW	Y	Y			
SI5505	BOOLIGAL			DNM	76	DNM/66	60	RAS/DNM		Y		WARNING	
SI5506	CARGELLIGO		AAS		64	AAS/63	58	NSW	Y				
SI5507	FORBES		AAS		60	AAS/58	58	RAS/NSW	Y				
SI5508	BATHURST		AAS		60	AAS/57	54	RAS/NSW	Y	Y			
SI5509	HAY			DNM	77	DNM/66	61	DNM		Y		WARNING	
SI5510	NARRANDERA		DNM		67	DNM/66	58	DNM/NSW				WARNING	
SI5511	COOTAMUNDRA		AAS		58	AAS/54	50	NSW	Y	Y			
SI5512	GOULBURN		AAS		81	AAS/55	55	NSW	Y	Y			
SI5513	DENILIQUIN		DNM		68	DNM/66	64	RAS/DNM/VIC				WARNING	73
SI5514	JERILDERIE		AAS		60	AAS/59	45	RAS/NSW	Y				
SI5515	WAGGA WAGGA		AAS		80	AAS/60	44	RAS/NSW/SMHEA		Y			
SI5516	CANBERRA		AAS		66	AAS/64	1:50K MAPS	DOI/NSW/SMHEA	Y	Y			
SI5601	SINGLETON		AAS		81	AAS/59	54	RAS/NSW	Y	Y			
SI5602	NEWCASTLE		AAS		58	AAS/53	53	NSW	Y	Y			
SI5605	SYDNEY		AAS		58	AAS/50	50	NSW	Y	Y			
SI5609	WOLLONGONG		AAS		60	AAS/57	54	NSW	Y	Y			
SI5613	ULLADULLA		AAS		64	AAS/64	1:50K MAPS	NSW	Y	Y			
SJ5402	NARACOORTE		AAS		68	AAS/66	66	RAS/SA	P	Y		PARTIALLY CONTOURED	
SJ5403	HORSHAM		AAS		67	AAS/65	63	RAS/SA	Y	Y			
SJ5404	ST ARNAUD		AAS		68	AAS/66	64	RAS/VIC	Y	Y			68
SJ5406	PENOLA		AAS		68	AAS/66	65	RAS/SA/VIC	Y	Y			
SJ5407	HAMILTON		AAS		68	AAS/67	66	RAS		Y			
SJ5408	BALLARAT		AAS		66	AAS/65	61	RAS/VIC	Y	Y			
SJ5411	PORTLAND		AAS		68	AAS/67	66	RAS		Y			
SJ5412	COLAC		AAS		77	AAS/67	66	RAS/VIC	Y	Y			68
SJ5501	BENDIGO		AAS		81	AAS/65	63	RAS/VIC	Y	Y			
SJ5502	WANGARATTA		AAS		68	AAS/66	63	RAS/VIC	Y	Y			
SJ5503	TALLANGATTA		DNM		68	DNM/66	66	RAS/VIC/SMHEA		Y		WARNING	73
SJ5504	BEGA		DNM		68	DNM/66	1:63K MAPS	NSW				WARNING	
SJ5505	MELBOURNE		AAS		60	AAS/57	1:63K MAPS	RAS/VIC	Y	Y			
SJ5506	WARBURTON			DNM	77	DNM/66	66	RAS/VIC		Y		WARNING	72
SJ5507	BAIRNSDALE		DNM		79	DNM/66	1:63K MAPS	VIC		Y			74
SJ5508	MALLACOOTA			DNM	76	DNM/66	1:63K MAPS	VIC		Y		WARNING	
SJ5509	QUEENSCLIFF		AAS		68	AAS/67	1:63K MAPS	RAS	Y	Y			
SJ5510	WARRAGUL		DNM		NO MAP	DNM							74
SJ5511	SALE		DNM		68	DNM/66	65	RAS		Y		WARNING	
SJ5515	DEAL ISLAND			DNM	77	DNM/65	64	RAS/DNM		Y		WARNING	
SK5501	KING ISLAND		AAS		60	TAS/60	1:250K MAP	TAS					
SK5502	FLINDERS ISLAND		AAS		60	TAS/60	1:250K MAP	TAS					
SK5503	BURNIE		AAS		60	TAS/60	1:250K MAP	TAS					
SK5504	LAUNCESTON		AAS		60	TAS/60	1:250K MAP	TAS					
SK5505	QUEENSTOWN		AAS		60	TAS/60	1:250K MAP	TAS					
SK5506	OATLANDS		AAS		60	TAS/60	1:250K MAP	TAS					
SK5507	PORT DAVEY		AAS		60	TAS/60	1:250K MAP	TAS					

MAP NO.	MAP NAME	PROV	ONE	TWO	DATE (1)(2)	COMPILATION	A.PHOT	SVY, CONTROL	CONTOURED	AMG GRID	UPDATED	MARGINALIA	REVISED (3)
SK5508	HOBART		AAS		60	TAS/60	1:250K MAP	TAS					

NOTES : 1 If no date of edition shown on map default date is that of compilation (PROV = provisional)

:2 NO MAP in Date Field indicates map was missing from the set provided (7 in all)

: 3 Map Index of1979 - NMP/78/062-4 was used for these data and to confirm other fields as well

Logo shown on map determined attribution to either RA Survey (AAS) or National Mapping (DNM)

ABREVIATIONS:

DELHI : Delhi Australia Petroleum Pty Ltd
DOI : Department of Interior
GOIL : Australian Gulf Oil Company Ltd
PET : Western Australia Petroleum (WAPET)
RAN : Hydrographic Office, Royal Australian Navy
SMHEA: Snowy Mountains Hydro Electric Authority
VCRB : Victorian Country Roads Board
WRE : Weapons Research Establishment, Dept. of Supply

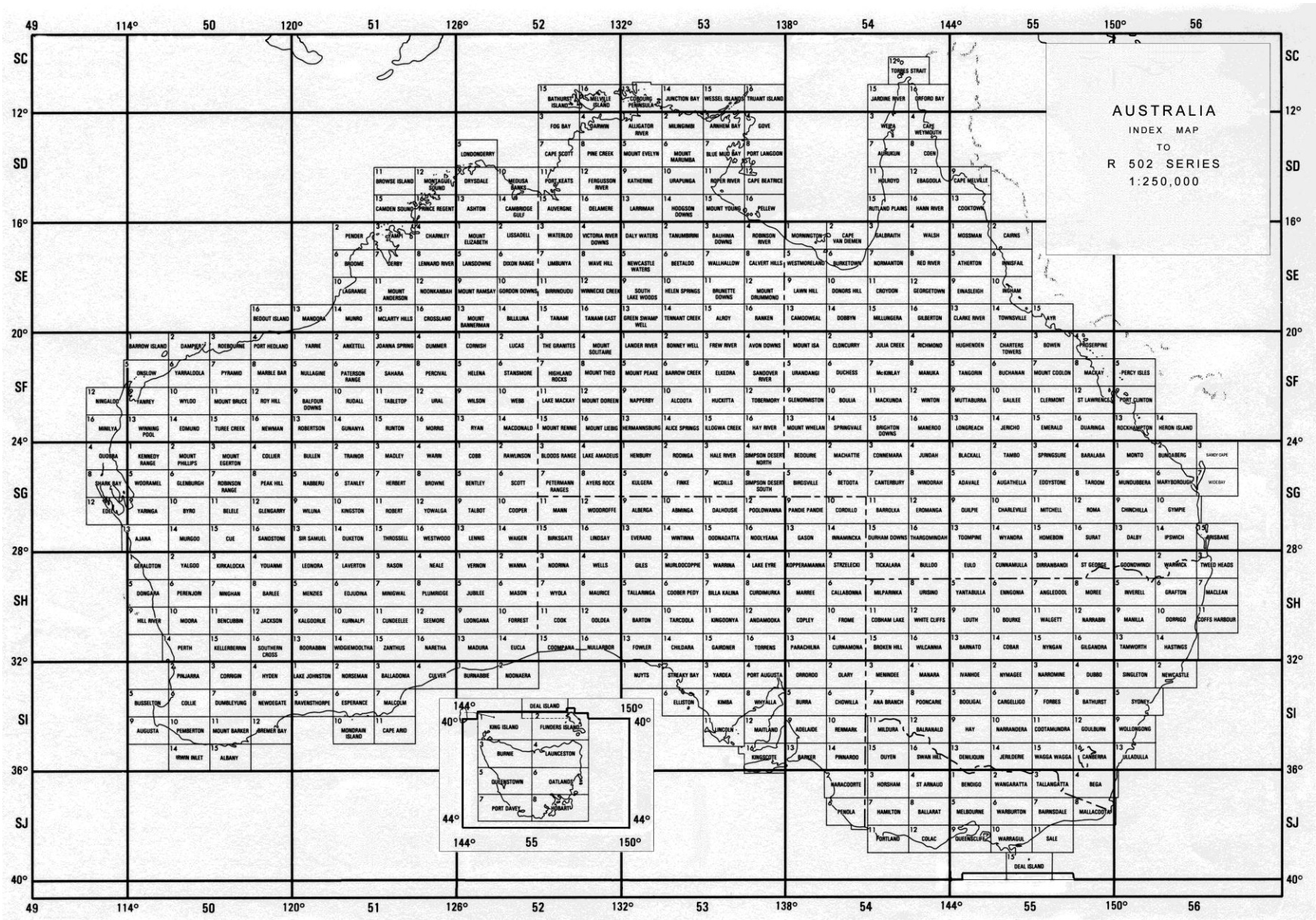
SUMMARY

AGENCY	MAP TOTALS	EDITION PROV	EDITION ONE	EDITION TWO
AAS	300 maps or 56%	4	281	15
DNM	240 maps or 44%	36	150	54
	540 maps total	40	431	69

COMPILATION BY AGENCY (4)	
217 (40%)	RAS
206 (38%)	DNM
92 (17%)	WA
14 (3%)	SA
3 (1%)	QLD
8 (1%)	TAS

CONTOURED	OVERPRINTED AMG Grid	OVERPRINTED Updates	MARGINALIA	REVISED POST 1968
124 maps or 23% contoured plus 5 partially contoured	231 maps or 43% overprinted AMG Grid in cyan	14 maps or 3% overprinted updates in magenta	181 maps or 34% "Not Field Checked"	88 maps or 16% revised

NOTE : 4 The above analysis indicates RA Survey compiled 217 sheets with National Mapping compiling 206. These figures differ by one (1) sheet from that of Lines in “Australia on Paper”.
It is noted that the Port Keats (SD52-11) sheet was compiled by National Mapping and published by RA Survey and probably accounts for the difference in the above figures.


AUSTRALIA
INDEX MAP
TO
R 502 SERIES
1:250,000