

Australian Surface Water Management Areas (ASWMA) 2000

Product User Guide

National Mapping Division, Geoscience Australia

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Technical support:

For up to date information on ASWMA 2000 refer to the Geoscience Australia website: www.ga.gov.au

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Acknowledgments:

Geoscience Australia gratefully acknowledges contributions to map content. Information is supplied by Commonwealth, State, Territory and local government, private sector agencies and individuals. A comprehensive list is available from our web site.

About this product user guide

This product user guide sets out the fundamental concepts and characteristics of ASWMA 2000. The guide begins with general information and provides more details in later sections. The overview of data content and structure will allow you to make immediate use of the data.

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User information

1.1 User support/contact information

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Geoscience Australia welcomes feedback on any aspect of its product or services. Please direct your comments or any queries regarding this document or data to:

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1.2 Geoscience Australia - National Mapping Division

Geoscience Australia is the national agency for geoscience research and spatial information. It serves government and supports the community through its output areas of geoscience for urban centres, oceans and coasts, and regional and rural areas.

The National Mapping Division within Geoscience Australia undertakes national mapping, remote sensing maritime boundary and land information coordination activities in support of Australia's economic and social development.

Other contributors 1.3

National Land and Water Resources Audit

ASWMA 2000 was developed by the National Land and Water Resources Audit (NLWRA) and is distributed by Geoscience Australia. NLWRA funded the compilation of the data. Sinclair Knight Merz (Spatial Division) undertook the compilation of the national coverage.

About ASWMA 2000

2.1 ASWMA 2000 components

Your ASMWA data package has two components which combine to give you a complete data product. The components are:

Product user guide

This guide describes the structure and content of ASMWA.

The number of files will vary with the application format of the data.

2.2 The ASMWA 2000 product

ASWMA 2000 contains the boundaries and names of Surface Water Management Areas (SWMA), river basins and drainage divisions. SWMA boundaries are used by each State and Territory for the management of surface water.

SWMAs were defined initially from Geoscience Australia's Australia's River Basins product which contains river basin and drainage division boundaries defined by the former Australian Water Resources Council (AWRC). Many SWMA Boundaries are equal to these basin boundaries, however in some States and Territories some SWMAs are a portion of these drainage basins, or new areas have been defined. Where there are new boundaries, these were defined by the relevant State or Territory.

2.3 Coordinate system

ASWMA 2000 data is available in geographical coordinates (latitude and longitude) in decimal degrees using the Geocentric Datum of Australia 1994 (GDA94).

Data loading

Application formats 3.1

The ASWMA 2000 data is supplied in three application formats:

- ArcInfo Export;
- ArcView Shapefile; and
- MapInfo mid/mif.

3.2 Description of files

The downloaded ASWMA 2000 package contains the following files.

Table 1: ASWMA 2000 files

Documentation files								
File name		File content						
42342_user_guide.	pdf	This user guide						
Data files								
	Arcinfo Export (*.e00)	ArcView Shapefile (*.dbf, *.shp, *.shx)	MapInfo mid/mif (*.mid, *.mif)					
File name	File size (KB)	File size (KB)	File size (KB)					
swma_geog_nat	39 848	(+_chain) 14 868 (+_point) 529 (+_polygon) 24 791	(+_chain) 31 942 (+_point) 138 (+_polygon) 54 176					
Total	39 848 KB/ 38.9 MB	40 188 KB/ 39.2 MB	86 256 KB/ 84.2 MB					

Data characteristics and concepts

4.1 ASWMA 2000 data concepts

Feature-based data

ASWMA 2000 uses a feature-based data model described by the following definitions. These are used to describe data that represent phenomena in the real world:

- Entity: A real world phenomenon which cannot be divided into phenomena of the same type.
- Feature instance: A single occurrence of a feature which has a unique set of spatial and attribute object
- Attribute: A descriptive characteristic of a feature. Attributes can be spatial (or locational) and aspatial (or non-locational).
- Attribute value: A value assigned to an attribute, either for a feature instance or its attributes.
- Feature class: A group of feature instances defined by a set of rules and having common attributes and relationships that are the properties of the corresponding real world phenomena.
- Entity class: A group of entities of the same kind, matching the members of a feature class.

The structure of a feature instance in the feature based data model can be summarised as: feature instance = [spatial object + attribute object]

Spatial object

Spatial objects are the locational attributes of the feature. In ASWMA 2000, they comprise the special cases of points, chains and polygons. Spatial objects have a spatial address which consists of one or more couplets (x, y) or triplets (x, y, z).

Point

A point is a geometric representation defined by a single (x, y) coordinate couplet or a (x, y, z) triplet. Three special points are used.

Entity point

An *entity point* is used to locate point entities, or area entities represented by a point because of the scale of the source material and/or scale of the final product.



Polygon label point

A polygon label point, contained within every polygon feature instance, locates information about that polygon. It is linked to the bounding chains of the polygon. In proprietary GIS software packages, this point type is sometimes known as a centroid.



Node

A *node* is a junction of two or more feature instances or an end point of a feature instance. Nodes may carry attribute information.



A chain is a spatial object composed of a sequence of non-intersecting line segments which is bounded by nodes at each end. Chains may carry topological information such as a reference to the polygons to the left and right (with respect to the direction of digitising) and reference the start and end nodes.

A line segment is a straight line between two consecutive vertices in a chain. Each vertex is defined by a single (x, y) coordinate couplet.



Figure 1: Chain spatial object

Polygon

A *polygon* is a bounded, continuous region consisting of an interior area, and an outer boundary defined by a set of chains. A polygon may also contain one or more non-nested inner boundaries also defined by sets of chains.

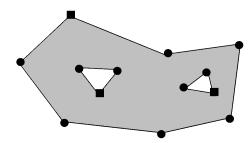


Figure 2: Polygon spatial object

Data structure and content

5.1 Data structure

The topological data model consists of lines, polygons and label points. The SWMAs are represented by polygons. The label point of each SWMA carries the attributes to identify the SWMA, River Basin and Division.

Each SWMA, Basin and Division polygon has a unique name and number. The label point of each SWMA carries the attributes to identify the SWMA, river basin and drainage division characteristics. Where a SWMA includes islands, the islands also carry the same attributes.

The spatial object and attribute object as previously defined are the primitive components of GEODATA. When combined, these objects define a feature instance. Features are grouped to form a hierarchy which is used for the capture and transfer of the data.

5.2 Data dictionary

Table 2: Attribute table of ASWMA 2000

Feature	Description	Object	Attribute	Attribute values
SURFACE WATER MANAGEMENT AREA (swma)	The boundaries used by each State and Territory for the management of surface water.		SWMA NUMBER (swma_no)	The unique identifier for the SWMA. The first three characters are the same as the BASIN_NO. Where SWMA_NO equals BASIN_NO, then the SWMA boundary is also the basin boundary. Where the SWMA_NO does not equal BASIN_NO, then the SWMA should be aggregated to define the basin boundary.
			SWMA NAME (swma_name)	Name of the SWMA. There are 324 unique SWMAs
			STATE (state)	ACT = Australian Capital Territory
				NSW = New South Wales
				NT = Northern Territory
				QLD = Queensland
				SA = South Australia
				TAS = Tasmania
			BASIN NUMBER (basin_no) DRAINAGE DIVISION NUMBER (dd_no)	VIC = Victoria
				WA = Western Australia
				The unique identifier for the associated Australian River (AWRC) Basin (1997). There are 246 unique River Basins. The SWMA is either completely contained within or coincides in major part with the assigned AWRC river basin.
				The unique identifier for the associated Australian (AWRC) Drainage Division. There are twelve unique identifiers. The SWMA is either completely contained within or coincides in major part with the assigned AWRC drainage division.

Data quality information

Lineage

For each State and Territory, SWMAs were defined initially from Geoscience Australia's Australia's River Basins (1997) product. All States except Tasmania and Western Australia split some of these basins into smaller areas to define a SWMA, or used a major part of the basin to define a SWMA. Where basins crossed a State/Territory border, the SWMAs were defined separately within each State/Territory.

The majority of border changes in SWMAs occur in Queensland and New South Wales. In Queensland, these borders have been based on the Queensland Water Allocation and Management Plan boundaries. While in New South Wales, they are defined by river basins and major storages managed by the Department of Land and Water Conservation (DLWC).

The lineage specific to each State and Territory is as follows:

Victoria

Two basins in the State were split into two to define the SWMAs 225.A, 225.B, 401.A and 401.B. These boundaries were created by digitising line-work from a series of 1:25 000 topographic maps.

South Australia

Changes were made in the eastern part of the State to ensure that the SWMAs followed the prescribed wells area and local government area boundaries. Prescribed well areas are those areas within which there are restrictions on groundwater extraction, All wells ("bores") must be licensed and there are restrictions on volume. These are legislated boundaries. The prescribed wells area and local government area boundaries were digitised from 1:50 000 topographic maps.

The majority of SWMAs are the same as Australia's River (AWRC) Basins (1997). Where differences exist, they have been split or the border realigned to reflect the Queensland Water Allocation and Management Plan boundaries.

Northern Territory

One basin from Australia's River (AWRC) Basin (1997) was subdivided into two SWMAs. This boundary was digitised from hand-drawn line on a 1:250 000 topographic map.

New South Wales

The following SWMAs were created 203.R, 210.R, 219.R, 409.R, 410.R, 412.R, 416.R, 418.R, 419.R, 421.R, 425.R and 499. Each of these were created in the following manner:

- 203.R 5 km buffer on the regulated portion of the river
- 210.R 5 km buffer on the regulated portion of the river
- 219.R 5 km buffer on the regulated portion of the river
- 409.R whole basin, including 5 km buffer on NSW side of Murray river to the end of river in NSW, and a 5 km buffer on Darling River north to extent of Wentworth weir pool.
- 410.R 5 km buffer on regulated rivers and the interior area of these buffered polygons to incorporate the irrigation districts and major groundwater extraction areas in the basin.
- 412.R 5 km buffer on regulated rivers and the interior area of these buffered polygons to incorporate the irrigation districts and major groundwater extraction areas in the basin.
- 416.R 5 km buffer on regulated rivers and the interior area of these buffered polygons to incorporate the major groundwater extraction areas in the basin
- 418.R 5 km buffer on regulated rivers and the interior area of these buffered polygons to incorporate the major groundwater extraction areas in the basin
- 419.R 5 km buffer on regulated rivers and the interior area of these buffered polygons to incorporate the major groundwater extraction areas in the basin
- 421.R 5 km buffer on regulated rivers and the interior area of these buffered polygons to incorporate the major groundwater extraction areas in the basin
- 425.R 5 km buffer on regulated rivers, less the Wentworth weir pool buffer of the Darling River included in 409.R

499 - 5 km buffer on the Darling River from Bourke to Mungindi, this SWMA does not align to any existing Australian River (AWRC) Basin.

River basins with major storages managed by the Department of Land and Water Conservation (DLWC) have been subdivided to distinguish between those parts of the basin in which part of the river system which are regulated SWMAs (suffixed with an R) and unregulated (SWMA suffixed with UR). Regulated river systems refer to those systems where a portion of the flow is controlled by upstream water supply infrastructure such as weirs or storages. Unregulated river systems refer to rivers where the flow is not controlled by water supply infrastructure. It should be noted that only basins where storages are managed by DLWC have been subdivided in this way. There are a number of other basins where significant regulation is carried out by other agencies and have not been subdivided.

Australian Capital Territory

There are three SWMAs covering the region. These were digitised from 1:25 000 topographic maps. The boundaries represent an aggregation of about 30 smaller catchment boundaries that were digitised in

Positional accuracy

The coastline is from Geoscience Australia's GEODATA COAST 100K data where, for planimetric accuracy, the summation of errors from all sources results in data with a standard deviation of 50 metres for welldefined points.

Attribute accuracy

All instances of a feature and its attribute values that meet the selection criteria and appear on the source materials are captured. The data is generalised so the selection of features is to some extent subjective.

The accuracy of the attribute information is considered 99%, these names and numbers have been checked by the NLWRA.

Logical consistency

Data have been independently tested to ensure compliance with Geoscience Australia's rules for topological integrity. The data were tested using UNIX scripts and Arc/INFO commands. ASWMA 2000 complies with the following rules for topology:

- The data has a node/chain structure:
- Every line feature has a node at each end;
- Every line feature has a node at intersections;
- There are no unnecessary pseudo nodes;
- Every polygon is closed;
- Every polygon contains a polygon label point;
- There are no coincident features;
- There are no undershoots, overshoots, broken lines or other artefacts; and
- National Coverage, 100% of all SWMAs are included in this coverage.

Completeness

100% of all SWMAs are included in this coverage.

Appendix A: Metadata

Note: This dataset description is metadata (data about data) which describes the actual dataset in accordance with the ANZLIC (Australia New Zealand Land Information Council) Core Metadata Guidelines Version 2.

Dataset citation

ANZLIC unique identifier: ANZCW0703005381

Title: Australian Surface Water Management Areas (ASWMA) 2000

Custodian

Custodian: Geoscience Australia

Jurisdiction: Australia

Description

Abstract:

ASWMA 2000 is a digital representation of the boundaries and names of Surface Water Management Areas (SWMA) which have been defined by a number of State and Territory water management agencies for use in national water resources reporting.

Many SWMA correspond to Geoscience Australia's Australia's River Basins 1997 boundaries data, however in some States and Territories some SWMAs are a sub-set or a major part of the basins.

The data has been produced by the National Land and Water Resources Audit (NLWRA) and is distributed by Geoscience Australia.

ANZLIC search words:

- **BOUNDARIES Mapping**
- WATER
- WATER Hydrology Mapping
- WATER Surface Management
- **WATER Surface Monitoring**
- **WATER Surface Resources**

Geographic extent name:

Australia excluding external territories

Note: The format for each Geographic extent name is: Name - Identifier - Category -Jurisdiction (as appropriate) See GEN Register

Geographic bounding box:

North bounding latitude: -9° South bounding latitude: -44° East bounding longitude: 154° West bounding longitude: 112°

Data currency

Beginning date: 1999-06-01 Ending date: 2000-11-01

Dataset status

Progress: Complete

Maintenance and update frequency: As Required

Access

Stored data format:

Digital: ArcInfo

Available format type:

Digital: ArcInfo Export Digital: ArcView Shapefile Digital: MapInfo mid/mif

Access constraints:

The data are subject to Copyright. Data files may be downloaded from Geoscience Australia's website at www.ga.gov.au/download/. A licence agreement is required.

Data quality

Lineage:

Australia's SWMA boundaries were initially defined from Geoscience Australia's Australia's River Basins 1997 data. All States and Territories, except for Tasmania and Western Australia, split some of the basins into smaller areas. The details of these are described in detail in ASWMA 2000's Product User Guide.

Positional accuracy:

The coastline is from Geoscience Australia's GEODATA COAST 100K data. For planimetric accuracy, the summation of errors from all sources results in data with a standard deviation of 50 metres for well-defined points.

Attribute accuracy:

All instances of a feature and its attribute values that meet the selection criteria and appear on the source materials have been captured. The data is generalised so the selection of features is to some extent subjective.

The accuracy of the attribute information is considered 99%. These names and numbers have been checked by the National Land and Water Resources Audit.

Logical Consistency:

Data have been independently tested to ensure compliance with Geoscience Australia's rules for topological integrity. The data were tested using UNIX scripts and ArcInfo commands to comply with the following rules for topology:

- The data has a node/chain structure
- Every line feature has a node at each end
- Every line feature has a node at intersections
- There are no unnecessary pseudo nodes
- Every polygon is closed
- Every polygon contains a polygon label point
- There are no coincident features
- There are no undershoots, overshoots, broken lines or other artefacts
- National Coverage, 100% of all SWMAs are included in this coverage.

Completeness:

100% of all SWMAs are included in this coverage.

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Metadata information

Metadata date: 2003-04-02

Additional metadata

Metadata reference XHTML: http://www.ga.gov.au/meta/ANZCW0703005381.html Metadata reference XML: http://www.ga.gov.au/meta/ANZCW0703005381.xml

Size of dataset: 38.9 - 84.2 MB depending on the format

Scale/resolution: Varied

Projection/datum: Geographical coordinates using the Geocentric Datum of Australia 1994 (GDA94)

Glossary

Attribute

A descriptive characteristic of a feature. An attribute has a defined set of attribute values.

Attribute object

The attribute object holds the non-locational or semantic information about the feature instance.

Chain

A line composed of a sequence of non-intersecting line segments bounded by nodes. Chains reference the polygons to the left and right of the chain.

Datum

A mathematical surface from which heights or positions are referenced.

Entity

A real world phenomenon which cannot be divided into phenomena of the same type.

Entity class

A group of entities of the same kind, matching the members of a feature class.

An entity point is used to locate point entities represented by a point because of the scale of the source material.

Feature

A feature is the cartographic or digital representation of a class of entity.

Feature class

A feature class is a group of feature instances defined by a set of rules and having common attributes and relationships that are the properties of the corresponding real world phenomena.

Feature instance

A single occurrence of a feature which has a unique set of spatial and attribute object values.

A process which may involve the selection, displacement, simplification, exaggeration or aggregation of features from their true position for the sake of cartographic clarity.

Geoscience Australia's brand of high quality digital data products for use in Geographic Information Systems (GIS).

Geodetic datum

A datum defines the basis of a coordinate system. A local or regional geodetic datum is normally referred to an origin whose coordinates are defined. The datum is associated with a specific reference ellipsoid which best fits the surface (geoid) of the area of interest. A global geodetic datum is now related to the centre of the earth's mass, and its associated spheroid is a best fit to the known size and shape of the whole earth. The position of a point common to two different surveys executed on different geodetic datums will be assigned two different sets of geographical coordinates.

Geographical coordinates

A position given in spherical coordinates commonly known as latitude and longitude.

Geographic Information System (GIS)

A spatial database which is manipulated via a set of spatial operators or commands.

Latitude

The latitude of a feature is its angular distance on a Meridian, measured northwards or southwards from the terrestrial Equator.

Longitude

An angular distance measured east or west from a reference meridian (usually Greenwich) on the earth's surface.

Node

A point that is a junction of two or more chains or which is the end point of a chain. Connectivity of chains is indicated by the sharing of nodes at their intersections.

Node/chain structure

The structuring of linear features in a layer so that they consist of chains broken by nodes at intersections or at the point where an attribute of the feature changes.

Point

A geometric representation defined by a single (x,y) coordinate pair or an (x,y,z) triplet.

Polygon

A continuous area defined by a set of bounding chains. There is only one external polygon and there may be one or more internal, non-nested inner boundaries.

Polygon label point

A point within a polygon feature instance used to locate labels or information about that polygon. This point is sometimes known as a centroid.

Positional accuracy

Statistical estimate of the degree to which planimetric coordinates and elevations of features agree with their real world values.

Projection

Any systematic way of representing the meridians and parallels of the earth upon a plane surface or map.

A direct line between a pair of points or a point and a node.

Spatial object

The spatial object holds the locational information of a feature instance. It is composed of either a point, chain or polygon.

Topological integrity

The measure of how well spatial data conform to the sophisticated data structure required for GIS, especially with respect to connectivity and adjacency.

Vector data

Vector data uses points and straight lines (vectors) to describe features on, or characteristics of, the earth's surface. Vector data can also include polygons, which are areas enclosed by a number of vectors. To record additional information, data attributes can be attached to individual vector features.

Vertex

The connecting point of two line segments.