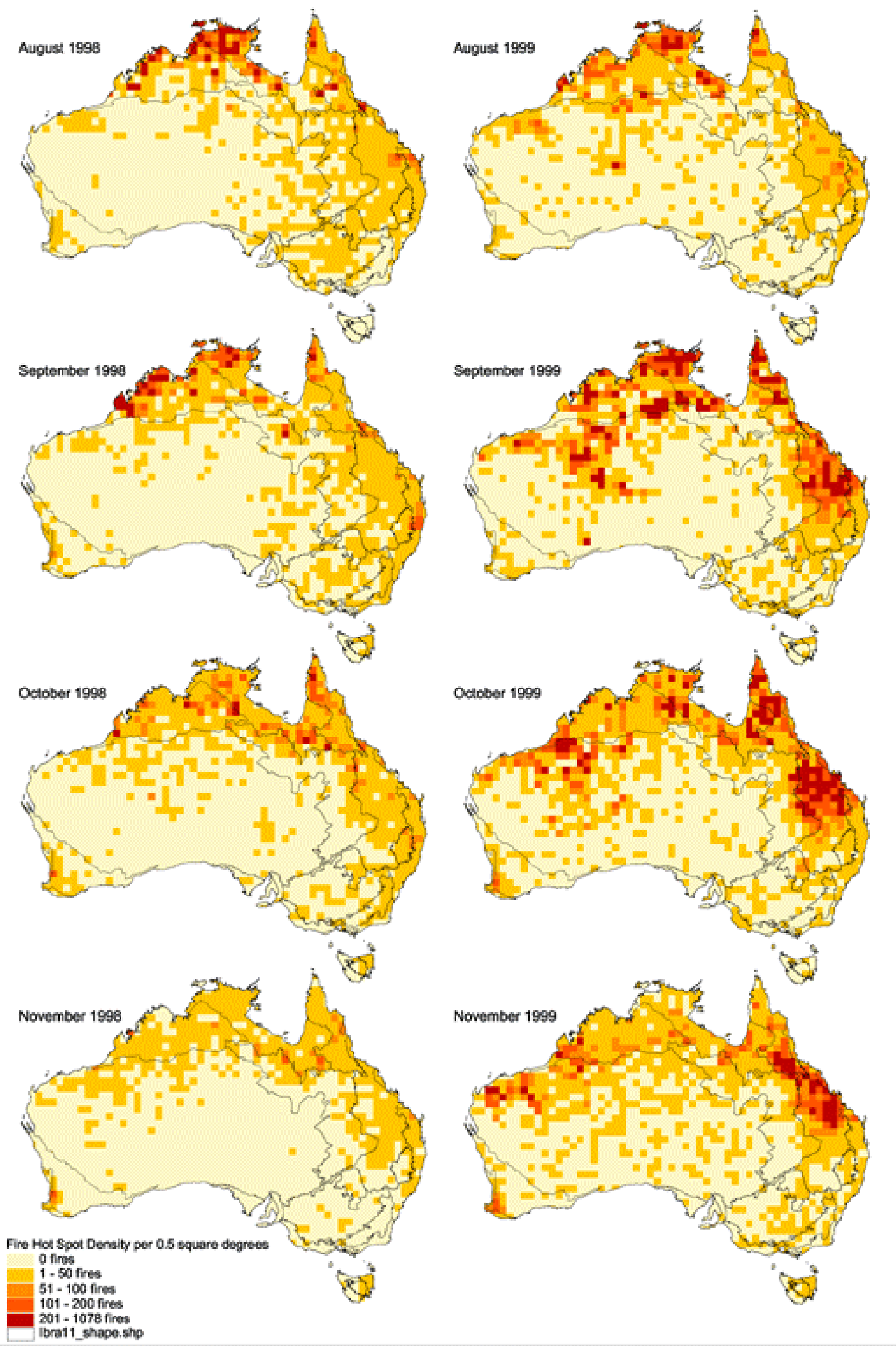
Figure 3.13. Fire Hot Spot Density - Monthly Distribution



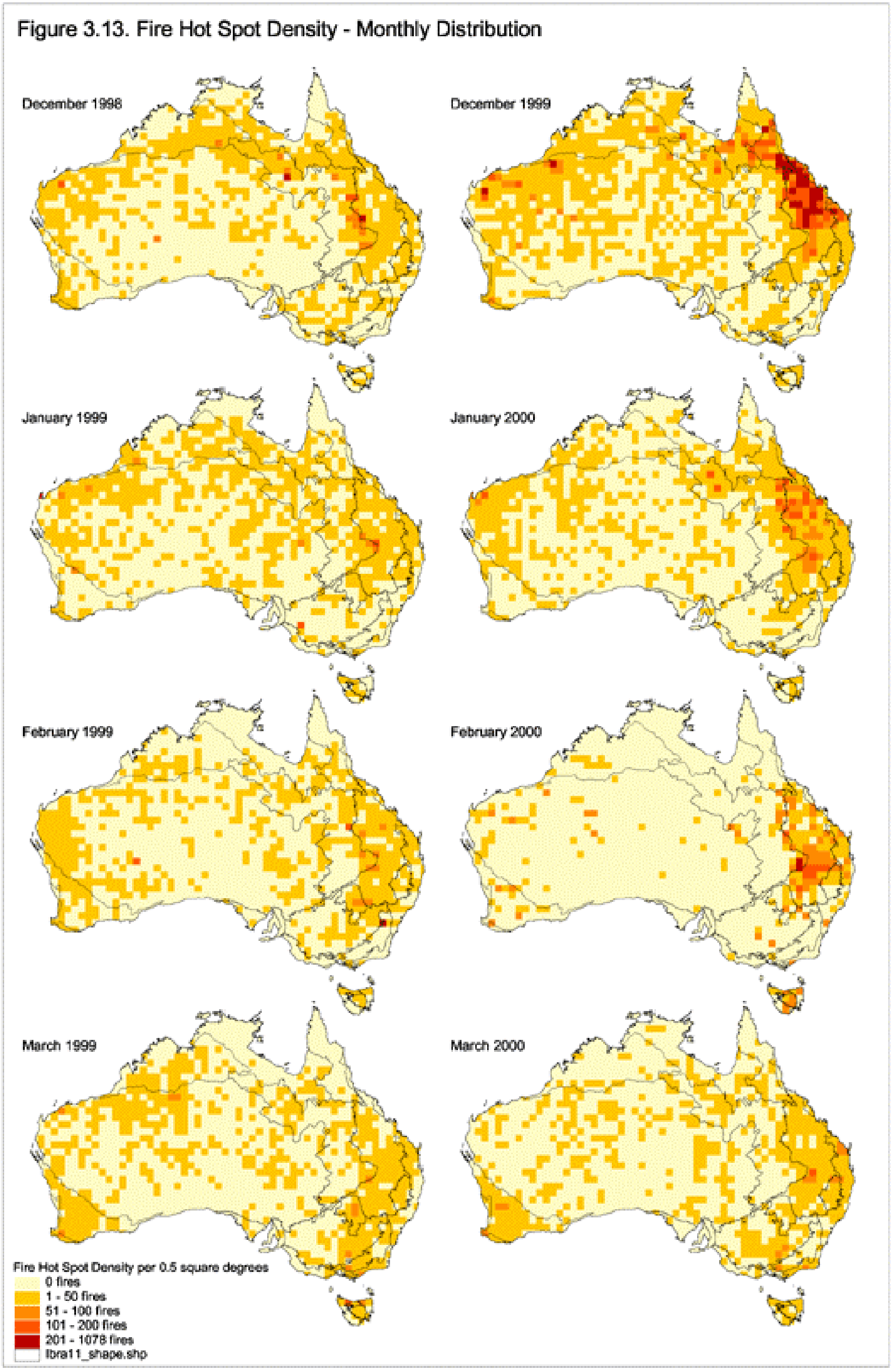


Figure 3.13 Fire hot spot density distribution on a monthly scale

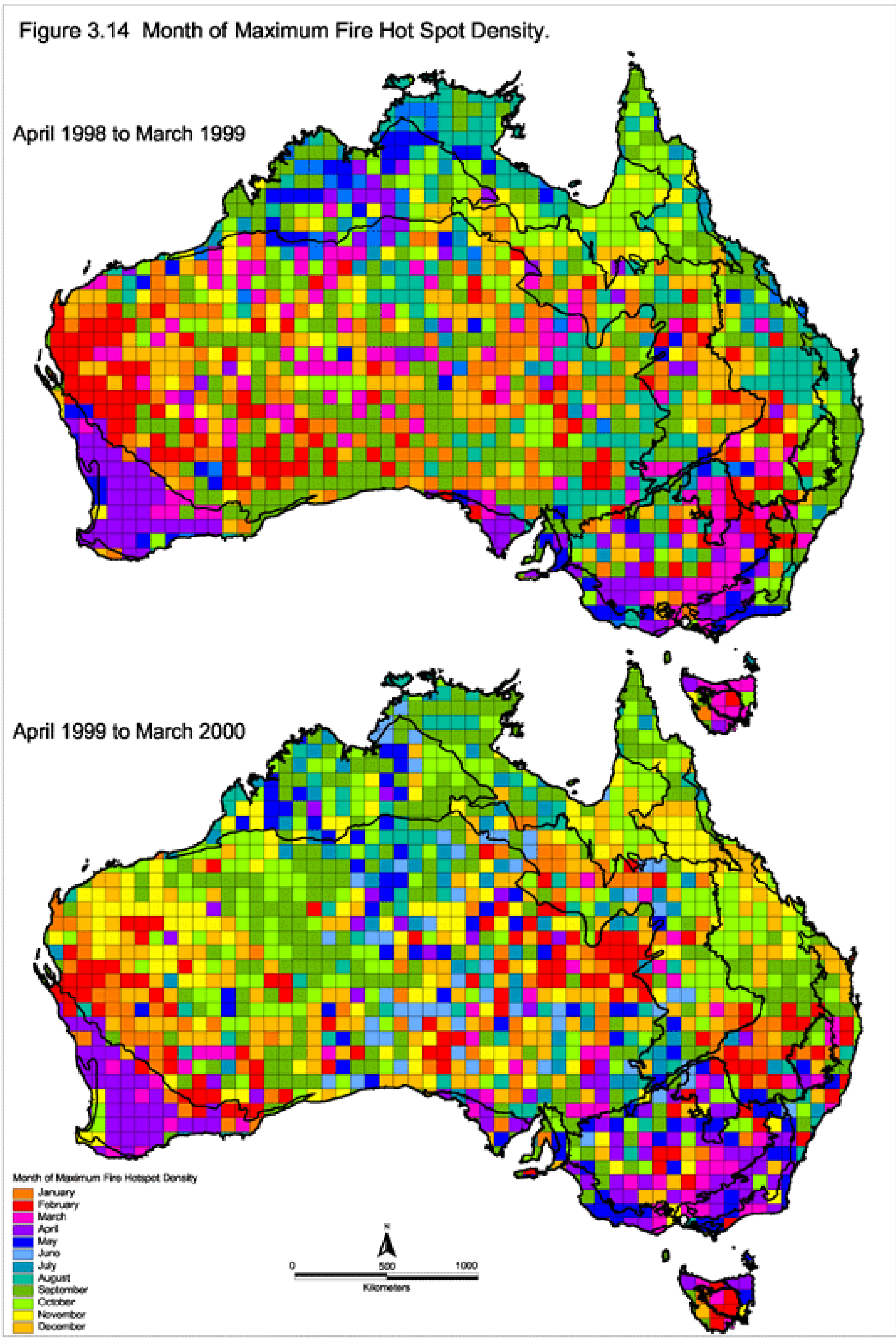


Figure 3.14 Month Peak fire density

3.6 Fire Hot Spots Exported to GIS

The Fire Hot Spot (FHS) dataset is stored and managed in a geographical information system (GIS) called FHSGIS. FHSGIS is a point based GIS. A point is defined as a location in geographical space determined by a set of coordinates.

The data within FHSGIS are un-projected and stored with latitude/longitude coordinates. The data were stored in an un-projected format as this was the simplest way to handle data over large areas that cross many geodetic zones.

The FHS data from a satellite image were stored as text files that contain the coordinates for each fire and a description of the fire, 1 or 0.75, which indicates a "fire" or "possible fire" respectively.

A list of all the FHS files to be processed for one month is stored as a text file. These file lists were used to tell the FHSGIS what files to process and where to get them. The user determined which month and year data to process by naming which file list the GIS should read. The structure of the FHSGIS is shown in Table 3.6.

Table 3.6 Information supplied in FHSGIS

Attribute	Description of Attribute
FHS_id	A unique identifier for each FHS made up of the data satellite receiving station; the satellite number (12 or 15), the orbit number, and the original number of fires detected.
Date	The date on which the pass the FHS was detected
Sat_ID	The NOAA satellite the pass came from, either 12 or 15
Orbit	The orbit number of the pass used to detect the FHS
Data_Src	The receiving station that captured the relevant pass (PER, MEL, DAR)
Longitude	The longitudinal coordinate for the point marking the FHS
Latitude	The latitudinal coordinate for the point marking the FHS
Description	This classifies the fire as either a fire (1) or a possible fire (0.75).
IBRA_id	A unique identifier for each polygon in the IBRA datasets (1…786)
Ibra80ID	The class number of the IBRA region (1….80)
IBRA80Name	The name of the IBRA region
REG	The abbreviation of the IBRA region
IPR11	The IGAER region (1…11)
State Name	Australian state or territory
IBRA80kmsq	The sum of all the polygons within each IBRA in km^2

The importation of FHS data into the FHSGIS is an automated system run via Avenue scripts in ArcView. Avenue is a scripting language built into ArcView that allows the automation of processing. Automation was essential due to the number of files to be processed. From April 1999 to March 2000 over 1400 files were imported in the FHSGIS. If these files were handled in the same way as the FAA data, that is the user inputs the satellite information, each file would take approximately two minutes to import. The time it takes to import a file is directly related to the number of fire hotspots in the file. On average the FHSGIS can process 10 files per minute.

The satellite information (date, Sat_ID, orbit number, and receiving station) for each fire hot spot was derived from the FHS text file path name.

NOAA AVHRR data are received at a number of satellite receiving stations across Australia (Data_Src). For the purposes of the FHS dataset, data from Perth, Melbourne and Darwin were used. The Perth images are the most commonly used. Typically there is an eastern and a western pass to cover the continent for one orbit number. There was no overlap between the eastern and the western passes that were received at one receiving station, but there could be areas of the continent not covered. These "holes" in the coverage were filled using data from the Melbourne and Darwin receiving stations. Eastern and western passes for both Darwin and Melbourne were processed; therefore it was possible for six images to be processed for complete continental coverage for one orbit number. There was overlap between the image from the different receiving stations. This lead to redundancy in the FHS dataset because some areas were covered more than once thus, one hotspot was recorded in more than one FHS file for one orbit number.

To detect and then delete fire hot spots that had been recorded more than once within a single orbit, all FHS text files with the same orbit number were imported into FHSGIS simultaneously. This set of files were compared between themselves and any FHS points found within five kilometres of a point from an overlapping file were deleted.

Once the FHS data had been imported into the FHSGIS and the satellite data added the file was intersected with the IBRA digital map (see Figure 1.1). Each FHS was assigned the attributes of the IBRA and IGAER with which it was spatially associated.

3.7 Analysis of Fire Hot Spots in Relation to IBRA Regions.

FHS data were converted to FHS density by taking the number of FHS detected in an IGAER and dividing it by the area (km^2) of that IGAER (Appendix 2).

The IGAER can be broken into four levels of fire hot spot density for the two year period. IGAER 5, 8, 9, and 11 showed a density of < 5 FHS/km^2. IGAER 7 showed a density of < 9 FHS/km^2. IGAER 1, 2, 3, and 6 showed a density < 25 FHS/km^2. IGAER 4 showed a density < 40 FHS/km^2. Overall the density of FHS was greater in the second year of study (Figures 3.14 and 3.15). IGAER 1-4 (North West Wet/Dry Tropics, North Wet/Dry Tropics, North East Wet/Dry Tropics and Wet Tropical Coasts) in both years of the study have the greatest FHS density and show a general peak in the months August-November. All of these IGAER occur in the north of

Australia. The remaining IGAER show a low FHS density (<10 FHS/km^2) throughout the year. These IGAER are in the arid interior and in the south of the continent.