DISTURBANCE HISTORY MAPPING PROJECT

NSW WESTERN REGIONAL ASSESSMENTS

JUNE 2000
DISTURBANCE
HISTORY MAPPING
PROJECT REPORT

BRIGALOW BELT SOUTH

SFNSW in conjunction with Pauline Curby (Historian) and Northern NSW Forestry Services

A project undertaken for
the Resource and Conservation Assessment Council
NSW Western Regional Assessments
project number WRA / 04
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This report describes a project undertaken for the Resource and Conservation Assessment Council as part of the regional assessments of western New South Wales. The Resource and Conservation Assessment Council advises the State Government on broad-based land use planning and allocation issues. An essential process for the western regional assessments is to identify gaps in data information and the best ways in which to proceed with data gathering and evaluation.

**Project objective/s**
The Disturbance History Mapping Project (DHMP) was established to consolidate available information on the management history of public forested land in the Pilliga and Dubbo areas of New South Wales since 1920. This report relates to both areas.

**Methods**
The project was established primarily as a mapping exercise to collect data for use by other WRA projects. Data were collated and assessed with regard to the following agents:

- logging and silvicultural treatment,
- prescribed burning and wildfire,
- previous clearing,
- regular grazing, and
- other relevant disturbances such as mining and mineral and gas exploration.

Specific stages of the project were identified as: definition of layers for mapping, data collation and assessment, data capture and mapping, and reporting.

**Key results and products**
The primary outputs of the project were a relational database (in two parts) and attributed Geographic Information System (GIS) layers representing particular management events. A number of “demonstration maps” were also prepared. This project did not undertake field validation or analysis of the data collected. The information was provided to RACD for dissemination to agencies and stakeholder groups.
1. INTRODUCTION

1.1 BACKGROUND

The Disturbance History Mapping Project (DHMP) was established to map the management history of forested land of public tenure in the Dubbo (State forests and Nature Reserves) and Pilliga areas (State forests only) since 1920. Other forms of public tenure (e.g., Crown Leases, Timbered Stock Reserves) were not investigated. This report relates to forests from both Dubbo and Pilliga areas. The specific objectives of this project were to:

- collate, summarise and assess available data on forest disturbance;
- identify and describe the agents of forest disturbance;
- map information to assist in describing the magnitude, extent and temporal characteristics of the various disturbance events;
- develop a series of digitised Geographic Information Systems (GIS) layers attributed with relevant disturbance history information, and
- produce a document which fully describes the processes used to examine and map the disturbance agents, thereby enabling validation and verification.

1.2 PREVIOUS PROJECTS

In 1996, State Forests of NSW commissioned three studies to examine the history of the Cypress Pine forests of the central western wheatbelt. The objective was to list, and to describe, the processes and events that had modified the forests and their distribution between 1750 and 1996. Selected forests in the Forbes (Allen 1998), Narrandera (Curby 1997) and Pilliga districts (van Kempen 1997) were examined. These studies provided a valuable insight on the history of the region. However, they were limited in their applicability to forest management because the studies were largely descriptive with limited reproduction of available spatial information.

1.3 PROJECT OUTPUTS

The primary outputs of this project were a relational database and a set of digital data layers produced using a GIS. These layers have both spatial and textual information making it possible to conduct analyses of a relational nature.
1.4 PROJECT LINKAGES

This information derived will be of benefit to a number of other WRA projects including:

- Vegetation Survey and Mapping,
- Targeted Flora and Fauna Survey, and
- Timber Resources Strategic Inventory.
2. METHODS

2.1 INTRODUCTION

The primary objective of this project was to collate available information on disturbance history and to make that information accessible to the WRA process as GIS layers captured at an appropriate scale. The initial project specification stated that the coverage “would be all land covered in Stage One of the Brigalow Belt South bioregion” and that the time frame “would be 1800 to the present”. However, as a result of a number of factors that became apparent as the project progressed, (e.g. accessibility of information on disturbance prior to 1920; lack of spatial information on location of Crown Lands; time available to verify and analyse the data collected) the project specifications were subsequently revised to restrict:

- collation of information to selected forests in the Pilliga and Dubbo areas;
- the time frame to be investigated to 1920 to 1999;
- land tenures to be studied to State Forest (Pilliga and Dubbo) and Nature Reserve (Dubbo only);
- mapping of information to the compartment level;
- assessment of precision and accuracy of information to a desktop review.

The methods adopted by the project were developed after discussions with State Forests staff at Western Region, members of an advisory group and the consultants employed to undertake the data collation and assessment. The following methods were applied to both Pilliga and Dubbo areas. Where there were variations between the two areas these are explicitly stated.

2.2 DATA COLLATION

During Stage One of the Regional assessment it was not possible to examine the history of all lands located within the Bioregion. To facilitate data collection the project was subdivided into two projects. Two independent consultants were engaged to undertake the projects which were: Project A (selected forests in the vicinity of Dubbo, including Goonoo SF) and Project B (forests of the Pilliga) (Table 2.1) (Figures 2a and 2b).
Figure 2a. State Forests and Nature Reserves in the vicinity of Dubbo
FIGURE 2b. State Forests in the vicinity of the Pilliga
TABLE 2.1 STATE FORESTS AND NATURE RESERVES (NR) STUDIED IN PROJECTS A AND B

A. Dubbo forests
- Beni Cobbora
- Breelong Coolbagge NR
- Eura Goonoo
- Lincoln Mogriguy
- Wongarbon NR Yarindury

B. Pilliga forests
- Baradine Denobollie
- Bibblewindi Etoo
- Coomore Creek Euligal
- Cubbo Jack’s Creek
- Cumbil Janewindii
- Pilliga forests Baradine Denobollie
- Bibblewindi Etoo
- Coomore Creek Euligal
- Cubbo Jack’s Creek
- Cumbil Janewindii

Data was obtained through discussions with staff from State Forests of New South Wales (SFNSW) and the National Parks and Wildlife Service (NPWS); and by auditing and collating relevant reports, files and maps held by SFNSW (Table 2.2) and NPWS. An existing database of Forest Sales (Forsale) was also consulted.

TABLE 2.2 EXAMPLES OF PRIMARY SOURCES OF HARD COPY DATA HELD BY SFNSW (ALL FILES UNLESS SPECIFIED*).

<table>
<thead>
<tr>
<th>Annual Management Report</th>
<th>Compartment histories*</th>
<th>Management statistics*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Report</td>
<td>Dedications</td>
<td>Mining Lease</td>
</tr>
<tr>
<td>Harvesting, silviculture and fire maps*</td>
<td>Fire</td>
<td>Mining on State Forest</td>
</tr>
<tr>
<td>Management Plan</td>
<td>Forest lease</td>
<td>Production statistics*</td>
</tr>
<tr>
<td>Mining</td>
<td>Form 48 (yield statistics)</td>
<td>R Report</td>
</tr>
<tr>
<td>Occupational Permit</td>
<td>General Management</td>
<td></td>
</tr>
<tr>
<td>SFNSW compartment history records*</td>
<td>Yield and revenue folders*</td>
<td></td>
</tr>
</tbody>
</table>

Note: The name and location of each source of information has been included in the relevant database.

Data were entered into a database (Microsoft MS ACCESS 97) developed for the collation of textual information. A separate database was used for each project. The databases included a data entry form (Figure 2c) with drop-down text boxes tailored to the needs of each project. The database fields are described in further detail in Appendices 7.1 and 7.2.

DISTURBANCE HISTORY - Dubbo forests

<table>
<thead>
<tr>
<th>PLACE</th>
<th>Yeindury</th>
</tr>
</thead>
<tbody>
<tr>
<td>SF No</td>
<td>713</td>
</tr>
<tr>
<td>Cpt No</td>
<td></td>
</tr>
<tr>
<td>Cpt Letter</td>
<td></td>
</tr>
<tr>
<td>Source (file unless specified)</td>
<td>Annual Reports</td>
</tr>
<tr>
<td>Location of source</td>
<td>Dubbo Regional Office Store</td>
</tr>
<tr>
<td>Feature</td>
<td>Non-commercial thinning</td>
</tr>
<tr>
<td>PERIOD COVERED BY RECORD</td>
<td>Financial year</td>
</tr>
<tr>
<td>Area affected in Acres</td>
<td>450</td>
</tr>
<tr>
<td>Year at Start</td>
<td>1967</td>
</tr>
<tr>
<td>Year at Finish</td>
<td>1968</td>
</tr>
<tr>
<td>Area not specified</td>
<td></td>
</tr>
<tr>
<td>MAP available?</td>
<td>No</td>
</tr>
<tr>
<td>PRODUCT</td>
<td></td>
</tr>
<tr>
<td>LINEAL FT</td>
<td>Ft3</td>
</tr>
<tr>
<td>Yard3</td>
<td>M3</td>
</tr>
<tr>
<td>Gallons</td>
<td>Tons</td>
</tr>
<tr>
<td>Litres</td>
<td>Tones</td>
</tr>
<tr>
<td>QUANTITY REMOVED / AREA AFFECTED IN METRIC UNIT</td>
<td></td>
</tr>
<tr>
<td>hectares</td>
<td></td>
</tr>
<tr>
<td>litres</td>
<td></td>
</tr>
<tr>
<td>Product Unit in Question</td>
<td></td>
</tr>
<tr>
<td>NOTE</td>
<td></td>
</tr>
</tbody>
</table>

Figure 2c. Data entry form designed in MS ACCESS 97
The primary disturbances investigated were harvesting, silvicultural treatment, fire and grazing. Data on disturbance events was collected at whatever scale was available (i.e. specific point, sub-compartment, compartment, forest or landscape). Each disturbance event was entered into the relevant project database and given an identifier based on the record number in that database. Where spatial information was available, the record was coded with a unique spatial identifier based on the State Forest and compartment number (see Appendices 7.1 and 7.2). Where original mapped sources were utilised, the maps were photocopied for each individual event and coded so that they could be related to the relevant record in the database. All data and hard copy maps have been retained and archived by the project.

There was a high degree of variation between forests as to the level of information available. This is reflected in the number of mappable records for Stage One. Section 2.3 below provides a preliminary assessment of the sources of information used and the data found on ‘disturbance events’.

### 2.3 DUBBO FORESTS (PROJECT A)

#### 2.3.1 Preliminary assessment of primary sources

The main sources of information used for the compilation of the database were SFNSW records located at Head Office (HO) (Pennant Hills) and Regional Office (Dubbo). These consisted of:

- annual reports (revenue and yield) from HO for each forest containing information on logging, often on a compartment by compartment basis, and removal of unwanted mature trees (culling) and non-commercial thinning (also called Timber Stand Improvement or TSI);
- compartment histories from Dubbo containing sometimes duplicated information on logging, TSI and removal of miscellaneous products that is contained in annual reports;
- other files and reports held mainly at Dubbo containing information on management and activities such as fire, mining and grazing; and
- Forsale database accessed at Dubbo containing records of logging yields by forest and compartment based on invoicing of sawmills.

Records of logging taken from the annual reports (revenue and yield) which date back to the 1920’s are generally specific in terms of volume and species logged and the location (compartment) of logging. Removal of unwanted mature trees (culling) and non-commercial thinning (TSI) is usually, but not always, specified according to location (compartment) and area (in acres or hectares). The accuracy of these records depends on the thoroughness/diligence of the forester/forest foreman who compiled them. To test accuracy, a random selection of compartments could be examined physically for evidence of past logging (stumps etc.). It may then be possible to assess the extent to which the physical evidence is confirmed/contradicted by the official records.

Compartment histories are normally a good source of information, but not in this case. If these are well kept they can be accessed quickly. This information would not replace
that from annual reports. It would, however, be useful to compare a random selection of data from the two sources to ascertain what degree of variation can be expected.

Information in other files and reports was scattered and patchy. It is time-consuming but useful to access these sources. They contain important material that is not available elsewhere such as some pre-1950s material e.g. disputes concerning grazing which confirm (and sometimes add to) the financial records contained in annual reports.

2.3.2 Preliminary assessment of data on ‘disturbance events’

Mapping of this data may be difficult and will generally only be specific to a compartment rather than showing the exact location of the ‘disturbance event’. Only about 10% of the data had a specific mapped area located and attached to the data sheet. More specifically:

- Records of logging taken from the annual reports (revenue and yield) were created as financial records. There appears to be a high degree of precision/accuracy in terms of species and volume logged. However, potentially there may be other activity that has not been recorded. Were there ever, for example, stockpiles of unsold timber? How much illegal logging took place? This is a record of what was sold, not necessarily of what was extracted from the forest. Oral evidence or management plans may reveal other logging that is not recorded in these records.

- Wildfire is usually recorded with a degree of precision. Gaps in the records may mean, however, that some fires have not been recorded.

- Removal of unwanted mature trees (culling) was usually recorded with considerable precision. This and non-commercial thinning (TSI) represented a considerable expenditure and is therefore thoroughly recorded in the Annual Reports (revenue and yield). Fieldwork would be needed to ascertain the extent to which this work was successful. For example in the Narrandera district there are frequent occurrences of species that were unsuccessfully ringbarked.

- Non-commercial thinning (TSI) records showed considerable variation from a high degree of specificity to fairly low. Some records specified the forest but not the compartment in which the TSI took place.

- Regular grazing has probably occurred more often than is indicated. There has been some loss of records. Illegal grazing is indicated on some occasions. This, depending on the management regime, may represent most of what occurred or may be the ‘tip of the iceberg’. In addition there is little indication of numbers of stock or seasonal variation.

- Previous clearing is indicated in only a couple of forests and is recorded in broad-scale terms.

- Apiculture (found only in hardwood forests) is recorded in the data with a low degree of specificity. The holding of a permit does not necessarily indicate the presence of bees or the exact location of hives.

- Mining/quarrying was not significant in this study. Some gravel pits were located but there has been no recorded history of mining in these forests. Some exploration has taken place but this did not lead to production.
2.4 PILLIGA FORESTS (PROJECT B)

2.4.1 Preliminary assessment of primary sources

The main sources of information used for the compilation of the database were SFNSW records located at Head Office (HO) (Pennant Hills) and Baradine Forest Centre (Baradine). These included:

- annual reports from HO containing information on logging, TSI and removal of miscellaneous products;
- occupation permit and forest lease files from HO containing information on grazing and to a lesser extent leases for other purposes (sawmill sites);
- compartment history files and maps from Baradine containing information on logging, TSI and removal of miscellaneous products;
- annual management plan report files from Baradine containing information on logging and other product yields;
- other files from HO and Baradine containing miscellaneous information on mining, exploration etc; and
- Forsale database accessed at Baradine containing records of logging yields by forest and compartment based on invoicing of sawmills.

Annual report files held at Head Office date back to the late 1920’s and generally conclude in the early 1960’s (the compartment histories from Baradine continue from there). Whilst the accuracy of the annual reports relies on the diligence of the recorder, they can be regarded as having an average to high degree of reliability, as they were the main form of yield monitoring and management reporting used at the time. At the very least they record disturbance events, but more importantly they give information on both areas and yields of various products and also record TSI and hardwood culling events.

Occupation Permit (OP) and Forest Lease files can be confusing to analyse because they do not always chart the history of a lease or OP. At times there are records of a lease being terminated, with no record of whether it was subsequently renewed, or leases with an expiry date but on-going records of grazing continuing. Also the oldest records are written in long hand (with a quill!) and can be both hard to read and to interpret. However the grazing records are a good indication of the fact that much of the Pilliga has been grazed at one time or another. The accuracy of the records can probably be regarded as better than average. These records, which have yet to be entered into the database, can be readily mapped once a digital tenure layer becomes available.

Compartment histories have been kept since about the 1950’s, with some records earlier than this. Whilst their accuracy has largely relied on the diligence of a long line of transitory foresters, as a rule the mapping information was either supplied by or entered by bush supervisors with considerable local knowledge. Where areas were not specified in the compartment history record, they were determined from the disturbance event maps in the compartment history (to be compiled as GIS layers in Stage Two). Areas were determined using a dot grid. In some instances areas were also determined from maps as a cross-reference check against the compartment history record. There are some gaps and inconsistencies throughout the records, although taken over the area as a
whole the information can be regarded as average to high in reliability and accuracy. For the latter years yield data can be cross-referenced against the Forsale database, although this was not done as part of this project.

Annual management plan report files contain yield information. However, there are no map records to accompany them and the yield information is not comprehensive. Generally the maps and data in the compartment histories serve the same purpose. Very little data of value was found in other files (mining, exploration etc.) but what was found was recorded.

2.4.2 Preliminary assessment of data on ‘disturbance events’

This project looked in detail at logging (and removal of other products), TSI (pine thinning and hardwood culling) and grazing. Other disturbance events such as mining, exploration, other leases, prickly pear destruction etc. were only recorded if there were records on management plan report files. For that reason, recording of such events may be incomplete. More specifically:

- Records of logging and other products (e.g. broombush, fuelwood, gravel) can be regarded as very reliable for both HO management records and compartment histories. However, at a finer scale, there was confusion. In the oldest HO records areas logged were sometimes not specified, just compartment numbers and State Forest (no equivalent map records could be found in the archives). Sometimes compartments were identified but no State Forest and vice versa (although the State Forest could subsequently be identified). In some older records a compartment number was not recorded. Volumes and quantities were often confusing (e.g. numbers of pieces versus volumes; lineal versus cubic feet, records covered more than one compartment). Some older compartment history records show logging on maps but no yields. Sometimes older records referred to ‘revocation areas’ within a SF, rather than a compartment. These discrepancies were generally confined to the older (pre 1950) records. They were neither frequent nor consistent.

- Records of Timber Stand Improvement (TSI) were regarded as reliable. However, older TSI records held in management report files at HO did not always specify a compartment or an area, although again this detail was usually provided elsewhere. The method of recording TSI treatments in compartment histories held at Baradine office (generally post late 1930’s) appeared to be consistent, with the same map shading used throughout (it appears that at some point in the last 20 or 30 years all old TSI records were collated and maps updated at Baradine). As was the case for logging and other products, there were a number of sources of confusion in the TSI records. In the oldest HO records, areas treated were sometimes not specified, just compartment numbers and State Forest (no equivalent map records could be found in the archives). In some records a compartment number was not stated, although it was not common. Sometimes compartments were identified but no State Forest and vice versa (although the State Forest could subsequently be identified) or older records referred to ‘revocation areas’ within a SF, rather than a compartment. Confusion also resulted from differences in terminology (e.g. ‘thinning’/ ‘silvicultural treatment’ and TSI). Any early records of ‘thinning’ or ‘silvicultural treatment’ were regarded as TSI (either cypress or hardwood culling or both).

- It cannot be guaranteed that the grazing data is complete. Sometimes the records did not contain sufficient information on renewal of leases or occupation permits (e.g. notices of expiry but no record of whether that actually happened).

- There seemed to be limited records of leases associated with mining, mineral or gas exploration, transmission lines, sawmill sites and pipelines. However, there is a history of such activity in the Pilliga. Where records were available they were recorded.
3. ANALYSIS

Detailed analyses of the data captured during this project were not undertaken because the project was primarily a data collection process. However, with further refinement the data could, for example, be used in Stage Two to determine indices of intensity of disturbance or to compare the distribution of fauna species to type of disturbance. In this report, interpretation of the data is restricted to presentation of a series of “demonstration maps” and summaries of the attribute fields.
4. RESULTS

4.1 TYPES OF DISTURBANCE

This project located records for a number of different types of disturbance (Table 4.1). The majority of records mappable to compartment level relate to “Product removed”. Except for “Fire – wildfire” (Pilliga only) and TSI (eg. silviculture, ringbarking, non-commercial thinning) records relating to “Other disturbance” cannot be mapped electronically at this time. Most of the information in this category has been recorded on hard copy maps only. It was envisaged that digitising of these maps be carried out as part of Stage Two. Data on volumes of product removed are being re-checked and have not been released to stakeholders.

<table>
<thead>
<tr>
<th>Product removed</th>
<th>Cypress sawlog</th>
<th>Gravel</th>
<th>Pinus</th>
<th>Sleepers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridge timbers</td>
<td>Cypress posts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brushwood</td>
<td>Eucalyptus oil</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Charcoal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christmas trees</td>
<td>Fencing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Craftwood</td>
<td>Fuel (wood)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cypress</td>
<td>Girders</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other disturbance</td>
<td>Fire - wildfire</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Charcoal pit</td>
<td>Experimental growth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Previous clearing</td>
<td>Mining</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire - control burn</td>
<td>Old buildings</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.1 Examples of types of disturbance for which records were found

NOTES

QUANTITIES REMOVED reported in feet (cubic, lineal, super), yards (cubic), gallons, litres, metres (cubic, lineal), pieces, tons or tonnes. SIZE OF AREA AFFECTED reported in acres or hectares.

4.2 GIS LAYERS

The results are provided in the form of GIS layers depicting an amalgamation of disturbance types (Table 4.2). Although data have been collected at various scales, data capture was largely restricted to compartment level detail. It was understood that this was sufficient to inform Stage One of the Western Regional Assessment. It was envisaged that digitising of data to sub-compartment level be carried out as part of Stage Two and that this data be used to inform other assessment projects.

The following ARCVIEW covers were developed for the Dubbo and Pilliga forests:

- Harvesting for sawlogs, sleepers, large products, fencing and mining timber and firewood (depicting areas where the full extent of harvesting is unknown at this time – mapped using compartment level information only);
- TSI (depicting areas where the full extent of each silvicultural event is unknown at this time – mapped using compartment level information only – not presented in this report);
- Fire (wildfire events for Pilliga only based on maps held by SFNSW); and
- Compartment boundaries.

**TABLE 4.2 EXAMPLES OF CATEGORIES OF DISTURBANCE USED TO PRODUCE GIS LAYERS AND MAPS**

<table>
<thead>
<tr>
<th>Category</th>
<th>Code</th>
<th>Specific product(s) / disturbance(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Products removed</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fencing and mining timber</td>
<td>4</td>
<td>Blocks, fencing, fencing timber, houseblocks, mining, mining timber, posts, rails</td>
</tr>
<tr>
<td>Firewood</td>
<td>5</td>
<td>Charcoal, firewood, fuel</td>
</tr>
<tr>
<td>Large products</td>
<td>3</td>
<td>Girders, piles, poles</td>
</tr>
<tr>
<td>Sawlogs</td>
<td>1</td>
<td>Cypress logs, hardwood logs, logs, sawlogs, softwood logs</td>
</tr>
<tr>
<td>Sleepers</td>
<td>2</td>
<td>Junk, hewn, roundbacks, sleepers, sleepers / girders, sleeper offcuts, transoms</td>
</tr>
<tr>
<td><strong>Other disturbances</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Controlled burning</td>
<td>20</td>
<td>Clearing and burning, control burn, stacked and burned, top burning, top burnt, top disposal and control, whole stack burnt</td>
</tr>
<tr>
<td>TSI cypress</td>
<td>7</td>
<td>Non-commercial thinning. Applies to cypress only</td>
</tr>
<tr>
<td>TSI hardwood</td>
<td>10</td>
<td>Culling and ringbarking. Applies to hardwood only</td>
</tr>
<tr>
<td>Wildfire</td>
<td>30</td>
<td>Burnt growth cut down, fire, wildfire</td>
</tr>
</tbody>
</table>

**NOTES**

- Code allocated to “Category” and “Specific product / disturbance” in project database
- HEWN defined as sleeper material shaped using hand tools
- HOUSEBLOCKS, BLOCKS defined as round stumps for houses
- JUNK, TRANSOMS defined as specialist sleeper pieces
- MINING, MINING TIMBER defined as pieces used for pit props or baulk
- PILES, GIRDER defined as pieces used for bridges
- POLES defined as pieces used for bridges, buildings or supporting telephone cables
- ROUNDBACKS defined as sleeper offcuts
- SLEEPERS / GIRDER defined as sleepers of similar dimensions to girders
- TSI is the acronym for Timber Standard Improvement

**4.3 DEMONSTRATION MAPS**

This report includes a number of maps based on an amalgamation of disturbance types (Appendix 7.3). Interpretation of these maps is subject to the following limitations:

- Harvesting was mapped at the compartment level (ie. sub-compartment detail not available). Therefore it is not necessarily the case that all of the area from within each forest compartment was affected (see also “Section 5.2 Scale and intensity”).
- It is highly likely that there were significant disturbance events prior to 1920. Furthermore, because of the time frame covered (80 years), records may have been lost or destroyed. Therefore absence of a record cannot necessarily be interpreted as nil disturbance for that area (see also “Section 5.3 Micro studies”).

**4.4 DATABASES**

The information collected to accompany the GIS layers, was entered and stored as MS ACCESS databases. The attribute fields are summarised in Appendices 7.1 and 7.2. Access to these databases should be obtained through the NSW Resource and Conservation Division (RACD) of the Department of Urban Affairs and Planning (DUAP) on (02) 9228 3166.
4.5 VALIDATION

Desktop validation of the textual and spatial data involves:

- removal of duplicate database records;
- re-checking the collated data, in GIS format, against records held in offices;
- amendment of attributes and linework as required; and
- the utilisation of local knowledge held by past and present employees of SFNSW.

This process was not complete at the time of writing of this report. Tasks remaining include rechecking of data on volumes of product removed (not released to stakeholders), removal of duplicate records and digitising of archived hardcopy sub-compartment information. However, the initial scan of the data suggests that any inaccuracies that may arise are unlikely to impact on the utility of the information provided to date.

4.6 REPORTING

Information from this project was presented at meetings convened as part of the Western Regional Assessment and at an informal gathering of members of the Dubbo Field Naturalist and Conservation Society.
5. RECOMMENDATIONS

5.1 PROJECT RESOURCES

For future projects, data collation will be made easier if the following items are made available prior to commencement:

- forest maps overlaid with relevant parishes and compartments,
- old compartment numbers and present equivalents with dates of changeover, and
- database set up at beginning of project.

For projects where there are severe time constraints or a limited budget, only annual reports (revenue and yield) should be accessed. If there is a known history of mining it is not time consuming to access Department of Mineral Resources data.

5.2 SCALE AND INTENSITY

The output from this project was restricted to compartment level information relating to the extent of harvesting fire and other disturbances. However, further work needs to be done to provide a measure of the scale (extent of compartment affected) and intensity (type and number of disturbance events).

In order to produce a GIS based tool for representation of data pertaining to forest management at a sub-compartment level it is recommended that:

- data captured in Stage One be refined and verified in Stage Two,
- sub-compartment detail is captured in Stage Two, and
- data collation and capture is expanded in Stage Two to include other forest areas and management types.

The data could be used to inform the development of strata for strategic inventory, assist in analyses into forest condition/change and fauna and flora response to disturbance.

5.3 MICRO STUDIES

Intensive micro studies of selected areas are possible where there is a good run of records. It is sometimes possible to undertake a project of this nature inclusive of the years prior to 1920 (early years of the twentieth century) depending on the records available.
Broad scale records are available from the 1880s for most areas. These could be utilised to ascertain, for example, the degree to which early TSI operations impacted on the later characteristics of the forest.

Contextual historic reports (not necessarily of the same depth as Allen 1998, Curby 1997 or van Kempen 1997) are desirable:

- to help make some historic ‘sense’ of the data,
- to allow for a more subtle qualification of the data, and
- for assessing National Estate heritage values.
6. REFERENCES


7. APPENDICES
<table>
<thead>
<tr>
<th>Name of attribute on FORM</th>
<th>Name of FIELD</th>
<th>Data Type</th>
<th>Description of FIELD on FORM in Access 97</th>
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## 7.2 OPTIONS IN TEXTBOXES ON DATABASE FORMS

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<thead>
<tr>
<th>Attribute on FORM</th>
<th>Project</th>
<th>Options in TEXT BOX on FORM in Access 97</th>
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</thead>
</table>

**NOTES**

ABORIGINAL SITES – A small proportion of records are involved. Release of the data has been delayed pending consultation with the aboriginal custodians.

OPTIONS – Where both Projects had attributes with the same options not all of the choices on offer may have been used. In some cases a more appropriate identifier may have been inserted.

PLACE – State Forest unless followed by NR (Nature Reserve)
These maps were prepared to demonstrate how the information from this project can be mapped.

The harvesting maps (1-10) were derived using compartment level records only. The fire maps (11-21) were based on hard copy maps held by SFNSW. Interpretation of these maps is subject to the limitations discussed in Section 4.3. There are a number of other ways in which the data can be represented. The maps could, for example, be amended to show the number of disturbance events. When sub-compartment level information becomes available it should also be possible to map the extent of the disturbance in each compartment.
Sawlogs

Demonstration Map 1. Dubbo forests – time since last sawlog operation
Demonstration Map 2. Dubbo forests – time since last sleeper operation
Demonstration Map 3. Dubbo forests – time since last large product operation
Demonstration Map 4. Dubbo forests – time since last fencing and mining timber operation
Demonstration Map 5. Dubbo forests – time since last commercial firewood operation
Demonstration Map 6. Pilliga forests – time since last sawlog operation
Demonstration Map 7. Pilliga forests – time since last sleeper operation
Demonstration Map 8. Pilliga forests – time since last large product operation
Demonstration Map 9. Pilliga forests – time since last fencing and mining timber operation
Demonstration Map 10. Pilliga forests – time since last commercial firewood operation
Demonstration Map 11. Pilliga forests – area burned in 1951 wildfire
Demonstration Map 12. Pilliga forests – area burned in 1957 wildfire
Demonstration Map 13. Pilliga forests – area burned in 1958 wildfire
Demonstration Map 14. Pilliga forests – area burned in 1966 wildfire
Demonstration Map 15. Pilliga forests – area burned in 1970 wildfire
Demonstration Map 16. Pilliga forests – area burned in 1974 wildfire
Demonstration Map 17. Pilliga forests – area burned in 1977 wildfire
Demonstration Map 18. Pilliga forests – area burned in 1978 wildfire
Demonstration Map 19. Pilliga forests – area burned in 1979 wildfire
Demonstration Map 20. Pilliga forests – area burned in 1982 wildfire
Demonstration Map 21. Pilliga forests – State Forest burned in 1997 wildfire