Title	Old Growth Forest Ecosystems CRAFTI Grid for CRA Upper North East. VIS_ID 5058
Alternative title(s)	FE_OldGrowth_CRAFTI_UNE_E_5058
Abstract	Map of the distribution of old-growth forest ecosystems across extant forest in the Upper North East CRA region. Two separate classifications and mapping techniques were used to derive the ecosystems in two distinct biogeographic regions and these classifications and maps were then expertly integrated and merged to create a full coverage across the region. They were then clipped to candidate old growth, component of the CRAFTI successional forest growth stage mapping. The 100m modelled grid data is to be used in a regional context and not for fine scale interpretation. For areas without detailed vegetation mapping (western portions of the UNE and LNE regions, and the southern portion of the LNE region) the modelled distributions were used to predict the proportion of a modelled ecosystem only. As a result, the exact spatial representation of the data is not designed to be accurate. VIS_ID 5058

Resource locator

Data Quality Statement	Name: Data Quality Statement Protocol: WWW:DOWNLOAD-1.0-http--download Description: Data quality statement for Forest Ecosystem Grid for CRA Upper North East. VIS_ID 3882 Function: download
Download package	Name: Download package Protocol: WWW:DOWNLOAD-1.0-http--download Description: Raster Data (Esri Grid & TIFF format) Function: download

Unique resource identifier

Code	4921babe-2f72-46bd-a61b-1ff6e9a010ab
Presentation form	Map digital
Edition	unknown
Dataset language	English

Metadata standard

Name	ISO 19115
Edition	2016
Dataset URI	https://datasets.seed.nsw.gov.au/dataset/4921babe-2f72-46bd-a61b-1ff6e9a010ab
Purpose	The old growth forest ecosystems were mapped for application in the Comprehensive Regional Assessment process.
Status	Completed

Spatial representation type	grid

Spatial reference system	
Code identifying the spatial reference system	4283

Spatial resolution	100 m
Additional information source	NPWS (1999). Forest Ecosystem Classification & Mapping for the Upper & Lower North East CRA Regions. Project number NA35/Eh.; DEC (2004). Field Key to Forest Ecosystems. Coffs Harbour. Old-growth Forest Related Projects - UNE / LNE Regions A project undertaken as part of the NSW Comprehensive Regional Assessments February 1999

Topic category

Keyword set

keyword value	VEGETATION FLORA
Originating controlled vocabulary	
Title	ANZLIC Search Words
Reference date	2008-05-16

Geographic location

West bounding longitude	151.5938
East bounding longitude	153.7542
North bounding latitude	-30.0373
South bounding latitude	-28.0258

Vertical extent information

Minimum value	-100
Maximum value	2228
Coordinate reference system	
Authority code	urn:ogc:def:cs:EPSG::
Code identifying the coordinate reference system	5711

Temporal extent

Begin position	1998-08-01
End position	N/A

Dataset reference date

Resource maintenance

Maintenance and update frequency	Unknown
Contact info	
Contact position	Data Broker
Organisation name	NSW Department of Climate Change, Energy, the Environment and Water
Telephone number	131555
Email address	data.broker@environment.nsw.gov.au
Web address	https://www.nsw.gov.au/departments-and-agencies/dcceew
Responsible party role	pointOfContact

Lineage

Eastern Portion of the CRA Region - west to the New England Highway; ; Data Collecton Method:; 1. Fine Scale Vegetation Mapping from Aerial Photograph Interpretation; 2. Field survey; 3. Mapping of ecosystems across areas covered by existing fine scale mapping; 4. Modelling of ecosystems across unmapped forest and cleared land; ; Data Set Source:; 1. The following fine scale vegetation mapping from aerial photograph interpretation was utilised:; * SFNSW Forest Typing; * Natural Resources Audit Council Multi-attribute Mapping; *

Coffs Harbour Council Vegetation Mapping; * Henry James Tweed Vegetation Mapping; * Department of Land and Water Conservation Nambucca Vegetation Mapping; * National Parks and Wildlife Service Coastal Vegetation Mapping; 2. Information from the following field surveys was utilised:; * Flora survey of Ben Halls Gap State Forest; * Flora Survey of Broadwater National Park; * Flora survey of Bundjalung National Park; * Flora Survey of the Coffs Harbour Local Government Area; * CRA Systematic Flora Survey; * Flora Survey of Demon Nature Reserve; * Vegetation Survey of the National Parks of Dorrigo District; * Eucalyptus dunnii survey; * John Hunter Granite Surveys; * Mount Neville Vegetation Survey; * Vegetation Survey of Myall Lakes National Park; * North East Forests Biodiversity Study Flora Sites; * Natural Resources Audit Council Flora Survey; * Joint Old Growth Project Flora data; * Hunter Valley Remnant Surveys; * Royal Botanic Garden Vegetation Data for the Guyra Mapsheet; * State Forest Environmental Impact Study flora data; * Tomaree National Park Vegetation Survey; * Tweed Coast Vegetation Survey; * Yuraygir National Park Flora Survey Sites; * Rainforest Floristic Traverses - Alex Floyd, Sally King and Woko National Park; 3. The following environmental layers were utlised to conduct analysis and modelling:; * Solar Radiation Index; * Minimum Temperature of the Coldest Month; * Mean Temperature; * Annual Rainfall; * Wetness Index; * Rainfall in the Driest Quarter; * Moisture Index; * Geological Classes; * Soil Fertility; * Soil Depth; * Topographic Position; * Ruggedness Indices; * Topographic Indices; * Slope; * Easting; * Northing; 4. Other datasets utilised were:; * CRA Aerial Photograph Intepretation Mapping (CRAFTI); * Eastern Bushlands Broad Vegetation layer; * Historical Portion Plan Data for a sample of Parishes across the region; * Vegetation Units from the Interim Assessment Process; ; Source Material Input Scale:; 1. All finescale vegetation mapping was conducted at a scale of 1:25000 or finer, including the CRAFTI data; 2. The Topographic Indices, Ruggedness Indices, Solar Radiation Index, Mean Temperature, Minimum Temperature of the Coldest Month, Slope, Wetness Index and Annual Rainfall layers were all derived at a 25m resolution and utilised a 25m Digital Elevation Model; 3. The Moisture Index, Rainfall in the Driest Quarter, Soil Fertility and Soil Depth layers were all derived at 200m resolution; 4. The Geological classes were captured at 1:250,000 scale; 5. The Eastern Bushlands broad vegetation layer was captured from landsat at a scale of 1:100,000; ; Additional Processing Steps:; 1. All finescale vegetation mapping was imported into ARCVIEW as shape files and the vegetation type attribution of each mapping project was expertly converted to an analagous SFNSW RN17 forest type classification; 2. The imported shapefiles were converted to ARCVIEW grids at a 50m resolution and merged into a single layer; 3. All survey data was imported into an ACCESS 97 flora database specifically designed for storage of the data and was subject to a sequence of manual and automatic checking procedures as outlined in attached metadata statements for each survey.; 4. A data matrix of sites by species by cover abundance was derived from the survey data for use in the analysis.; 5. All environmental layers were imported as ARCVIEW grids and resampled at 50m.; 6. Analyses were undertaken of existing RN17 forest types with sufficient floristic sites using the full floristic survey data to assess the floristic variation and the environmental data to map that variation. The analysis utilised an analytical technique known as Analysis of Similarities (ANOSIM). The analytical methodology was applied using software developed specifically for this purpose by the NPWS GIS Research and Development Unit. The software was implemented as an extension within the ArcView GIS package, and coded using the Avenue scripting language with calls to external C++ functions, where necessary, to perform intensive mathematical processing.; 7. Forest ecosystems derived from the analysis were mapped within existing (albeit converted) mapped forest type polygons by iterative application of binary divisions of environmental variables at a 50m resolution. These applications were derived from the analysis process as a decision tree for each forest type which indicated the sequence of binary environmental splits and final merges required to produce the derived forest ecosystems.; 8. All derived ecosystem grids were merged to create a final ecosystem layer within the mapped extent.; 9. The pre-1750 distribution of each derived eucalypt ecosystems was modelled in relation to abiotic environmental variables using data extracted from areas covered by existing fine scale mapping. Non eucalypt ecosystems were not able to have models fitted because the coarseness of the classification for these ecosystems precluded the development of statistical relationships with environmental predictors. ; 10. For each eucalypt forest ecosystem a random sample of 1ha grid cells was drawn from all cells mapped as containing that ecosystem and a second sample of cells was drawn from all cells mapped as not containing the ecosystem. Samples were selected in a manner which minimized problems of spatial autocorrelation and model overfitting. A logistic regression model relating the probability of presence of each forest ecosystem to abiotic environmental and geographical variables was then fitted using generalised additive modelling (Yee and Mitchell 1991), a technique already applied extensively by NPWS in forest assessment work in NSW. Generalized additive models (GAMs) use a nonparametric smooth function relating the response variable to the predictor.; 11. These fitted models were then used to extrapolate the distribution of forest ecosystems across all unmapped forest and cleared areas. ; 12. The modelling was conducted via a modelling module (produced by Watson, 1996) which fitted regression models under S-PLUS statistical software (StatSci, 1995) and conducted extrapolation using ARCVIEW Spatial Analyst (ESRI, 1996).; 13. The modelling resulted in a probability surface (extrapolated distribution) for each forest ecosystem at 100m resolution. A single layer depicting the pre-1750 distribution of each forest ecosystem was derived from the overlay of all the forest ecosystem probability surfaces by randomly proportionally assigning each gridcell to a forest ecosystem according to the relative probabilities of each ecosystem at that gridcell.; 14. In the zone of overlap between the mapping schemes from the western and eastern portions of the CRA region, western ecosystems overrode the mapped distribution of eastern ecosystems for those ecosystems for which the western ecosystem models were deemed (via expert opinion) more robust then the eastern ecosystem models. ; 15. An extensive analysis of data from historical portion plans was used to inform the pre-1750 distribution of eucalypt forest vegetation (versus other native vegetation types). Each data point from historical portion plans was assigned to open eucalypt forest or non eucalypt vegetation based predominantly on the corner tree type recorded by the surveyors and secondarily on the description provided by the surveyors. From this information, the proportion of open eucalypt forest to non eucalypt vegetation was calculated for each vegetation unit derived during the Interim Assessment Process (NPWS 1996). Vegetation units for which no historical portion plan data was collected, were assigned the proportions of their nearest neighbour in the dendrogram for which data was available. This then provided a full coverage of the likely proportion of pre-1750 eucalypt forest on a vegetation unit by vegetation unit basis. Gridcells were then randomly proportionally allocated to eucalypt forest or not according to the vegetation unit value. The non-eucalypt gridcells were then cut out from the pre-1750 ecosystem layer within cleared land and did not contribute to the derivation of pre-1750 area values for eucalypt ecosystems.; 16. The distribution of mapped ecosystems was then merged over the pre-1750 layer derived from modelled distributions.; 17. For all extant forest with or without existing fine scale mapping, rainforest was derived from a merge of the CRAFTI rainforest mapping and RN17 rainforest mapping. Rainforest so derived was merged with the pre-1750 ecosystem layer.; 18. Non-forest outside finescale vegetation mapping was derived from the CRAFTI layer and merged with the pre-1750 ecosystem layer.; 19. The extant forest ecosystem layer was derived by masking the pre-1750 ecosystem layer with the extant forest layer from the CRAFTI layer.; ; Western Portion of the CRA Region - west of the New England Highway; ; Data Collecton Method:; 1. Field survey; 2. Analysis and Modelling; 3. Integration with existing fine scale vegetation mapping; ; Data Set Source:; 1. Information from the following field surveys was utilised:; * Eastlink Flora Survey; * Torrington State Recreation Area Vegetation Survey; * State Forest Environmental Impact Study flora data; * CRA Systematic Flora Survey; * John Hunter Granite Surveys; * Royal Botanic Garden Vegetation Data for the Guyra Mapsheet; 2. The following environmental layers were utlised to conduct modelling:; * Mean temperature; * Mean annual rainfall; * Soil fertility; 3. The following fine scale vegetation mapping was utilised:; * Vegetation mapping of Torrington State Recreation Area; 4. Other datasets utilised were:; * Eastern Bushlands broad vegetation layer; ; Source Material Input Scale:; * The Eastern Bushlands broad vegetation layer was captured from landsat at a scale of 1:100,000; * The vegetation mapping of Torrington State Recreation Area was conducted at a scale of 1:50,000; * The temperature and rainfall variables were derived at 250m grid cell resolution and the soil fertility was derived at a 200m grid cell resolution.; ; Additional Processing Steps; 1. All survey data was imported into an ACCESS 97 flora database specifically designed for storage of the data and was subject to a sequence of manual and automatic checking procedures as outlined in attached metadata statements for each survey.; 2. A data matrix of sites by species by cover abundance was derived from the survey data for use in the analysis.; 3. The pre-1750 distribution of each derived eucalypt ecosystems was modelled in relation to abiotic environmental variables based on the presence/absence of each ecosystem at each survey site.; 4. A logistic regression model relating the probability of presence of each forest ecosystem to abiotic environmental and geographical variables was then fitted using generalised additive modelling (Yee and Mitchell 1991), a technique already applied extensively by NPWS in forest assessment work in NSW. Generalized additive models (GAMs) use a nonparametric smooth function relating the response variable to the predictor.; 5. These fitted models were then used to extrapolate the distribution of forest ecosystems across all unmapped forest and cleared areas. ; 6. The modelling was conducted via a modelling module (produced by Watson, 1996) which fitted regression models under S-PLUS statistical software (StatSci, 1995) and conducted extrapolation using ARCVIEW Spatial Analyst (ESRI, 1996).; 7. The modelling resulted in a probability surface (extrapolated distribution) for each forest ecosystem at 100m resolution. A single layer depicting the pre-1750 distribution of each forest ecosystem was derived from the overlay of all the forest ecosystem probability surfaces by randomly proportionally assigning each gridcell to a forest ecosystem according to the relative probabilities of each ecosystem at that gridcell.; 8. In the zone of overlap between the mapping schemes from the western and eastern portions of the CRA region, western ecosystems overrode the mapped distribution of eastern ecosystems for those ecosystems for which the western ecosystem models were deemed (via expert opinion) more robust then the eastern ecosystem models. ; 9. An extensive analysis of data from historical portion plans was used to inform the pre-1750 distribution of eucalypt forest vegetation (versus other native vegetation types). Each data point from historical portion plans was assigned to open eucalypt forest or non eucalypt vegetation based predominantly on the corner tree type recorded by the surveyors and secondarily on the description provided by the surveyors. From this information, the proportion of open eucalypt forest to non eucalypt vegetation was calculated for each vegetation unit derived during the Interim Assessment Process (NPWS 1996). Vegetation units for which no historical portion plan data was collected, were assigned the proportions of their nearest neighbour in the dendrogram for which data was available. This then provided a full coverage of the likely proportion of pre-1750 eucalypt forest on a vegetation unit by vegetation unit basis. Gridcells were then randomly proportionally allocated to eucalypt forest or not according to the vegetation unit value. The non-eucalypt gridcells were then cut out from the pre-1750 ecosystem layer within cleared land and did not contribute to the derivation of pre-1750 area values for eucalypt ecosystems.; 10. Torrington vegetation mapping was imported as a shapefile into ARCVIEW and attributes were converted to the derived ecosystem classification. The layer was then converted to a grid at 100m resolution and merged over the pre-1750 ecosystem layer.; 11. The extant forest ecosystem layer was derived by masking the pre-1750 ecosystem layer with the extant forest layer from the Eastern Bushlands database.; ; Attributes:; Value = unique ecosystem identification field, Count = area of ecosystem in hectares, Ecosystem = ecosystem name, Feat_ID = unique entity identification field for use in C-plan; ; Limitations: ; For areas without fine scale vegetation mapping (western portions of the UNE and LNE regions, and the southern portion of the LNE region) the modelled distributions were used to predict the proportion of a modelled ecosystem only. As a result, the exact spatial representation of the data is not designed to be accurate.; ; Completeness: ; Complete although further refinement/improvement over the years has been planned. The table is updated with target achievement statistics annually - these are based on original JANIS criteria and measure the representativeness of the CAR reserve system.; ; UNE - The spatial dataset coverage is complete for the entire extant forest in the Upper North East region as delineated by the CRAFTI extant forest layer. Areas of forest less than 10ha will not be included in the extant forest layer. Since the forest ecosystem layer is derived from mapped forest types where available, small areas less than 2ha in size or 50m in width are not represented.

Limitations on public access

Scope	dataset

DQ Completeness Commission

Effective date	2001-01-01
Explanation	The spatial dataset coverage is complete for the entire extant forest in the Upper North East region as delineated by the CRAFTI extant forest layer. Areas of forest less than 10ha will not be included in the extant forest layer. Since the forest ecosystem layer is derived from mapped forest types where available small areas less than 2ha in size or 50m in width, are not represented..

DQ Completeness Omission

Effective date	2001-01-01
Explanation	The spatial dataset coverage is complete for the entire extant forest in the Upper North East region as delineated by the CRAFTI extant forest layer. Areas of forest less than 10ha will not be included in the extant forest layer. Since the forest ecosystem layer is derived from mapped forest types where available small areas less than 2ha in size or 50m in width, are not represented..

DQ Conceptual Consistency

Explanation	The logical consistency tests done were:; * a test of valid values within each initial forest type and derived forest ecosystem; * a visual check of the initial forest type maps and derived forest ecosystem layer

DQ Topological Consistency

Explanation	The logical consistency tests done were:; * a test of valid values within each initial forest type and derived forest ecosystem; * a visual check of the initial forest type maps and derived forest ecosystem layer

DQ Absolute External Positional Accuracy

Explanation

1. All areas with fine scale vegetation mapping were derived at a scale of 1:25,000. Areas with fine scale vegetation mapping have an estimated positional accuracy of map polygon boundaries of within 25m.;
2. Survey sites are generally located using a Geographic Positioning System and 1:25,000 topographic maps and involve the use of set bearings and measured distances from known points. Survey sites are generally considered accurate to within 100m.;
3. All environmental variables were derived at 1:25,000 or 1:100,000 scale except for the geological layer which was rarely used and was derived at 1:250,000 scale. All environmental variables except for the geology layer have an estimated positional accuracy of within 100m. Details of the positional accuracy of the environmental variables used to derive and model the forest ecosystems is decoumented in separate metadata statements for those layers.;
4. For areas without fine scale vegetation mapping (for the eastern and western portions only) the modelled distributions were used to predict the proportion of a modelled ecosystem only. The nature of the random, proportional assignment

process which was utilised to derive the most accurate areal figures, means that the exact spatial representation of the data is not designed to be accurate. Whilst areal calculations derived from such an approach are valid and reliable, any printed map is only one of many equally valid representations.

DQ Non Quantitative Attribute Correctness

Explanation The attribute of this dataset is the forest ecosystem which is derived from analysis of full floristic survey data. Three different approaches were utilised to classify forest ecosystems in the three distinct biogeographic regions within the CRA area and these are described below.; ; Eastern Portion of the CRA Region - north of the Hunter River to the northern boundary of the Lower North East region and west to the New England Highway; ; The forest ecosystem classification was derived by splitting and amalgamating SFNSW mapped forest types based on an analysis of full floristic variation between field survey plots, in relation to abiotic environmental variables. The approach is described briefly below:; 1. Pairs of forest types (which contained greater than 10 survey sites) within the same league were tested for initial amalgamation based on floristic similarity using the statistic described below in step 5 and testing the hypothesis described below in step 9 and utilising a canopy species cover abundance matrix. Twenty four forest types were amalgamated prior to analysis of further floristic variation.; 2. All forest types or forest type amalgamations from this process which contained greater than 10 full floristic sites were assessed for floristic variation.; 3. For each forest type with greater than 10 sites, a search was conducted of all possible binary environmental splits for that type which maximised floristic compositional dissimilarity between the two resulting groups of sites, relative to the floristic variation exhibited within these groups. Each binary environmental splits was defined in terms of a cutpoint which was used to map the floristic distinction within the forest type. Twenty-eight forest types and forest type amalgamations were subject to identification of floristic splits.; 4. A Bray Curtis measure of dissimilarity was utilised to derive a sites by sites dissimilarity matrix based on non-standardised full floristic cover abundance data and it was from this matrix that a statistic of floristic difference was derived.; 5. The statistic which was used to measure the floristic difference was where is the average 'between group' dissimilarity and is the average 'within group' similarity.; 6. The statistical significance of D was estimated using a Monte Carlo randomization procedure (Manly 1991) in which D is repeatedly calculated after randomly permuting the assignment of sites to groups. The value of D obtained using the real grouping of sites was then compared to the distribution of D obtained using random permutations.; 7. The randomization procedure was used to test whether the observed value of D was greater than a specficed threshold of 0.01 by estimating the probabilility that the true value of D is actually less than or equal to the threshold. This provided a more rigorous test than the null hypothesis, because a split was only considered significant when the floristic difference between resulting groups was significantly greater than 0.01, not just significantly greater than zero.; 8. This procedure was applied iteratively until no further significant variation was present within the resultant groups, or until there were 5 or less sites in the resultant groups, or until a floristically distinct and meaningful unit was derived. This iterative splitting generated a hierarchical classification of floristic groups in which each division in the hierarchy was defined in terms of an environmental decision rule. One hundred and forty resultant groups were derived from the splitting process.; 9. The final products of the splitting were tested for potential re-amalgamation with products from the same forest type or different forest types by testing the hypothesis that the observed value of D was significantly less than a 0.01 threshold by estimating the probability that the true value of D was actually greater than or equal to 0.01. Seventy eight products were re-amalgamated through this process.; ; The methodology was peer reviewed by Dr Mark Burgman and Dr Mike Austin. A total of 133 forest ecosystems were derived from the analysis in the eastern portion. Fifty-five forest types were not subject to further analysis because of limited size or lack of sufficient survey sites and the forest type attribution was carried through to the final map for these types. A forest type is defined as any group of tree-dominated stands which possess a general similarity in composition and character and the forest type classification is an intuitive, expert derived classification.; ; Rigorous statistical estimates of prediction error using cross-validation resampling procedures are currently being applied to the derived forest ecosystem layer. Field validation of a proportion of forest ecosystems is also currently underway.; ; The predictive accuracy of ecosystem-environment models can be inferred from work conducted previously on species-environment models and information derived during the modelling process. Confidence limits were estimated for each of the probability surfaces interpolated from species-environment models. These indicate the prediction error expected throughout the study area. Another useful measure estimated for all fitted models is the percentage of deviance explained by the model. These measures should be interpreted with some caution as they measure prediction error by simple resubstitution which tend to underestimate the true prediction error of the model. Three additional measures are also produced during the modelling process which describe the performance of the model in terms of model discrimination, calibration and refinement.; ; Western Portion of the CRA Region - west of the New England Highway; Numerical classification was applied to all sites from the western portion and some Tablelands sites from the eastern portion of the region using the 'PATN' pattern analysis package (Belbin 1993). The classification was conducted using full floristic cover-abundance data. A matrix of sites by species with cover baundances was input to PATN using the modules 'PRAM' (data parameters definition) and 'DATN' (data input-output). The PATN output groups were reviewed for floristic composition with reference to other existing published classifications from the western region and an appropriate level of classification expertly assigned by variation to the final level of the dendrogram on the basis of the comparisons. Thirty four forest ecosystems were derived from the classification.; ; Comparison of bioregional classifications to produce single classification; The two derived classifications were expertly assessed for analagous types based on investigation of full floristic abundance information. Six western types were considered analagous with eastern types to derive a total of 164 ecosystems for the Upper North East region.

Responsible party

Contact position	Data Broker
Organisation name	NSW Department of Climate Change, Energy, the Environment and Water
Telephone number	131555
Email address	data.broker@environment.nsw.gov.au
Web address	https://www.nsw.gov.au/departments-and-agencies/dcceew
Responsible party role	pointOfContact

Metadata point of contact

Contact position	Data Broker
Organisation name	NSW Department of Climate Change, Energy, the Environment and Water
Telephone number	131555
Email address	data.broker@environment.nsw.gov.au
Web address	https://www.nsw.gov.au/departments-and-agencies/dcceew
Responsible party role	pointOfContact

Metadata date

2024-02-26T14:13:28.546927

Metadata language