Assessing representativeness in Tasmanian forests and proposed additional reserves using indicators of biological productivity and effects of historical patterns in land clearing

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February 2012

Report to the Independent Verification Group for the Tasmanian Forests Intergovernmental Agreement

Suggested citation:
Knight, R.I. (2012). Assessing representativeness in Tasmanian forests and proposed additional reserves using indicators of biological productivity and effects of historical patterns in land clearing. Report to the Independent Verification Group for the Tasmanian Forests Intergovernmental Agreement, February 2012. Natural Resource Planning, Hobart.

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1. Introduction

This report provides an assessment of indicators of Representativeness in Tasmanian forests as part of the assessment of High Conservation Value (HCV) forests by the Independent Verification Group (IVG) established under the Tasmanian Forest Inter-Governmental Agreement between the Australian and Tasmanian Goverments. Under the IGA, 572,000ha of forest are proposed by Environmental Non-Government Organisations (ENGOs) as additions to the formal protected area network which is defined here as the National Reserve System (NRS) (hereafter, "ENGO forest polygons"). The IVG is required to assess their conservation values.

Representativeness is defined here as per Australian Government policy as part of the CAR triptych (Comprehensiveness, Representativeness and Adequacy). It refers to the variability in biodiversity found within a given ecosystem type. The underlying intent is that the protected area network should reserve the full range of within-type variability, as the following quotes suggest:

- "Representativeness - those sample areas of the forest that are selected for inclusion in reserves should reasonably reflect the biotic diversity of the communities" (National Forest Policy Statement 1992[1]).

- "Representative - : the inclusion of areas at a finer scale [than Comprehensiveness and Adequacy], to encompass the variability of habitat within ecosystems" (National Reserve System scientific framework[2]).

Representativeness complements the criterion of Comprehensiveness in that they address different scales at which the representation of biodiversity is assessed. Representativeness can be assed using various indicators of biological diversity including environmental and biotic surrogates.

The objectives of this of this work were to:

1. Assess the conservation value of the ENGOs forests in terms of improving the Representativeness of the NRS based on an index of habitat productivity; and
2. Assess the impacts of habitat loss through historical land clearing patterns on the current options for achieving Representativeness.

The specific scope of the work was:

> "Assessment of the representativeness of the proposed conservation areas with respect to site productivity:
>
> - Integrate existing vegetation mapping, existing and proposed conservation reserves and synthetic land system components from existing data sources;

[1] Commonwealth of Australia (1995). National forest policy statement: a new focus for Australia's forests. Second edition, Australian Government Publishing Service, Canberra.
[2] http://www.environment.gov.au/parks/nrs/science/scientific-framework.html Accessed 16 February 2012.

- Stratify land components dataset to facilitate analysis of representativeness against site productivity;
- Other data (e.g. Forestry Tasmania PI-type data) relevant to stratification of site productivity to be incorporated subject to availability;
- Draft reporting template to be prepared for consideration by IVG;
- Carry out spatial data processing to enable tabulation of reservation by land system components; and
- Prepare a summary of the analysis."

Data from Forestry Tasmania's Productivity (PI-type) index based on native forest height potential was used as a surrogate for habitat productivity gradient. Data on the relative degree of clearance of land components defined using land systems classification was used to assess implications of past clearing on options for achieving representativeness.

The report describes the methods and results of the Representativeness analyses against these data.

Species can be found which are adapted cross the productivity gradients but of particular interest are those species which associate with higher productivity sites (for examples see Braithwaite et al. 1984[3], 1993[4], Lunney and Leary 1988[5], Montague-Drake et al. 2011[6], Moore et al. 2004[7], Simila et al. 2002[8]). Conservation of these species is assessed using the Productivity index.

The second indicator of Representativeness asssesses biases in the clearing of particular land types from land use history - the Representativeness (Clearing Bias) indicator. This assesses the extent to which ENGO forest polygons include land components (see Section 2.1) for which options for inclusion in the reserve system may have been foreclosed or limited by past land clearing patterns, or have been of sufficient magnitude and pattern to disrupt regional ecosystem processes (for a review see James and Saunders 2001[9]).

- Representativeness (Clearing Bias) indicator - An assessment of the extent to which ENGO reserve proposals include land components (see Section 2.1) for

[3] Braithwaite, L.W., Turner, J. & Kelley, J. (1984). Studies of the arboreal marsupial fauna of eucalypt forests being harvested for woodpulp at Eden, New South Wales. III. Relationships between fauna densities, eucalypt occurrence & foliage nutrients and soil parent materials. Australian Wildlife Research, 11:41-48.
[4] Braithwaite, W., Belbin, L., Ive, J. & Austin, M. (1993). Land use allocation & biological conservation in Batemans Bay forests of New South Wales. Australian Forestry, 56:4-21.
[5] Lunney, D. & Leary, T. (1988). The impact on native mammals of land-use changes & exotic species in the Bega district, New South Wales, since settlement. Australian Journal of Ecology, 13:67-92.
[6] Montague-Drake, R.M., Lindenmayer, D.B., Cunningham, R.B. & Stein, J.A. (2011). A reverse keystone species affects the landscape distribution of woodland avifauna: a case study using the Noisy Miner (Manorina melanocephala) & other Australian birds. Landscape Ecology, 26(10):1383-1394.
[7] Moore, B.D., Wallis, I.R., Marsh, K.J. & Foley, W.J. (2004). The role of nutrition in the conservation of the marsupial folivores of eucalypt forests. pp549-575 in Lunney, D. (Ed.). Conservation of Australia's forest fauna. Second edition, Royal Zoological Society of New South Wales, Mosman.
[8] Similä, M., Kouki, J., Mönkkönen, M. & Sippola, A.L. (2002). Beetle species richness along the forest productivity gradient in northern Finland. Ecography, 25(1):42-52.
[9] James, C. & Saunders, D. (2001). A framework for terrestrial biodiversity targets in the Murray-Darling basin. Commonwealth Scientific & Industrial Research Organisation & Murray-Darling Basin Commission, Canberra.

which options for inclusion in the reserve system may have been foreclosed or limited by past land clearing patterns, or have been of sufficient magnitude and pattern to disrupt regional ecosystem processes (for a review see James and Saunders 2001[10]).

Section 2 describes the methods used to develop each of the indicators, along with data sources and processing used to support the analysis.

Section 3 provides a summary of the result of each of the assessment methods.

It should be noted that the indicators have been developed within the relatively tight timeframes of the IVG process, and have not been subject to extensive review or field testing. Their use is intended to contribute to and provide context to the broad range of assessments of conservation values being undertaken by the IVG.

[10] James, C. & Saunders, D. (2001). A framework for terrestrial biodiversity targets in the Murray-Darling basin. Commonwealth Scientific & Industrial Research Organisation & Murray-Darling Basin Commission, Canberra.

2. Methods

The following sections describe the data sources and methods that were used to generate assessments of Representativeness and to assess the relative contribution of the ENGO forest polygons to the Representativeness of the reserve system.

The architecture of the methods comprises a integrated GIS layer incorporating all relevant input data and a summary table of the ENGO forest polygons which is populated to generate summary data and maps.

Section 2.1 describes the data sources and processing methods that were used.

Section 2.2 describes the development of the Productivity (PI-type) indicator.

Section 2.3 describes the development of the Representativeness (Clearing Bias) indicator.

2.1 Data sources

IVG_tenure-14.shp
This is a GIS layer developed for the IVG process to integrate data on existing land tenures and on the additional areas proposed for reservation. It includes:

- The CAR reserves layer (*Tas_reserve_estate_attr_gda94.shp*) generated annually by DPIPWE for a range of purposes associated with reporting reservation. It includes reserves from a number of sources, including dedicated formal reserves, informal reserve, private reserves (under covenant and management agreement), indigenous protected areas and areas included in the NRS. The version of data used was as at 30 June 2011.
- The Public Land Classification (*theLIST_PLC_gda94.shp*) maintained by DPIPWE. This layer comprises Crown lands that have been classified for a range of public purposes. The layer obtained for the project was dated 10 November 2011. It was used to determine both underlying public land tenure categories and also to update reserves gazetted after 30 June 2011 for the CAR reserves assessment.
- Private Reserves layer (*theLIST_privatereserves_GDA94.shp*) maintained by DPIPWE. This is a continuously maintained layer of areas of private land reserved under covenants, management agreements or private wildlife sanctuaries. The layer was only used to identify reserves on private land gazetted between 30 June 2011 and 10 November 2011.
- IVG reserve proposals data (*IGA_RSfinal.shp*). This data comprises the GIS layer providing spatial boundaries of each of the 270 ENGO forest polygons being considered as additional reserves under the IGA. The version supplied for the task was dated 2 December 2011, and includes polygons ranging in size from <0.1ha through to >60,000ha.

These data sources were integrated using geoprocessing methods that preserved the unique identifier and area of each polygon in each of the input sources. Where the intersection resulted in logically inconsistent data from different sources, a data hierarchy was used to control attribution for final use. A separate metadata file describing the processing methods and fields within the integrated tenure layer has been prepared.

Height_potential.shp

This data layer was provided under license to the IVG by Forestry Tasmania. It contains attributes from within Forestry Tasmania's air photo interpretation ("PI-type") mapping system on the native forest height potential of extant native forests (for a general description see Stone 1998[11]). The data stratifies eucalypt forests mapped in the PI-type system according to their potential height at maturity using the following classes:

- E1* average height > 76m
- E1 average height 55 - 76m
- E2 average height 41 - 55m
- E+3 average height 34 - 41m
- E-3 average height 27 - 34m
- E4 average height 15 - 27m
- E5 average height < 15m

Although included in the PI-type classification, no areas of class E1* mapped in data provided.

Lsys+LcTPI29-1.shp

This data layer was developed by Natural Resource planning and provided under license to the IVG. It contains mapping of "synthetic" land components for Tasmania combining a six class landform classification derived from 25m DEM with modified boundaries of Tasmania's 440 mapped land systems (Davies 1988[12], Pemberton 1986[13], 1989[14], Pinkard 1980[15], Pinkard and Richley 1982[16], Richley 1978[17], 1984[18],). The term land components is used in the Tasmanian land systems classification, but is consistent with the term 'land unit' *sensu* Christian 1958[19], Christian and Stewart 1953[20]) applied to land systems descriptions and mapping elsewhere in Australia.

[11] Stone, M.G. (1998). Forest-type mapping by photo-interpretation: A multi-purpose base for Tasmania's forest management. Tasforests, 10:15-32.
[12] Davies, J. B. (1988). Land systems of Tasmania, Region 6: South, East and Midlands. Department of Agriculture, Hobart.
[13] Pemberton, M. (1986). Land systems of Tasmania region 5: Central Plateau. Department of Agriculture, Tasmania.
[14] Pemberton, M. (1989). Land systems of Tasmania, Region 7: South West. Department of Agriculture, Hobart.
[15] Pinkard, G.J. (1980). Land systems of Tasmania region 4: North-east Tasmania. Tasmanian Department of Agriculture, Hobart.
[16] Pinkard, G.J. & Richley, L.R. (1982). Land systems of Tasmania region 2: Furneaux Islands. Tasmanian Department of Agriculture.
[17] Richley, L.R. (1978). Land systems of Tasmania region 3: North-west Tasmania. Tasmanian Department of Agriculture, Hobart.
[18] Richley, L.R. (1984). Land systems of Tasmania region 1: King Island. Department of Agriculture, Tasmania.
[19] Christian, C.S. (1958). The concept of land units and land systems. Proceedings of the Ninth Pacific Science Congress, 20:74-81.

The six landform classes in the data are:

- Elevated plains;
- Crests, ridges and upper slopes;
- Steep mid-slopes;
- Steep lower slopes (e.g. incised streams);
- Gentle lower slopes; and
- Lower plains.

The landforms broadly form a topo-sequence within each of the land systems, although not all landforms are necessarily present in a land system. For example, land systems on floodplains have relatively relief and may form a pattern of elevated plains and lower plains with relatively limited areas of other classes.

The combination of land systems and their landform classes form a total of about 2,400 individual land units mapped across Tasmania. The land system classification within the data provides for access to broad patterns of rainfall, altitude, geological age, geological subtract and general landscape descriptors (e.g. rolling low hills).

Each land component within the data is attributed with the percentage area of its total extent which has been cleared (Tasveg 2.0 data). This measure is referred to as the Clearing Bias for the land component and is applied to all occurrences of it (see Section 2.3).

A detailed description of this layer and associated data is included in Attachment 1.

APU7_current.shp (v714)
The Atomic Planning Units (APU) data is an integrated GIS layer developed and maintained by Natural Resource Planning for storing and analysing a wide range of biodiversity spatial data attributes. The version of the APUs used for the project uses Tasveg v2.0 as it base vegetation layer, into which additional primary Statewide (e.g. RFA old growth, RFA biophysical naturalness, IBRA bioregions, CFEV subcatchments) and derived data (e.g. native vegetation patch metrics, threatened species habitat) have been incorporated.

The part of the data set used for the analysis was the attribution of broad vegetation classes (forest, native non-forest, cleared land, water, sand and mud, and vegetation errors) in order to identify areas that are mapped as forest.

[20] Christian, C.S. & Stewart, G.A. (1953). General report of the survey of the Katherine-Darwin region 1946. Land Research Series No. 1, CSIRO Australia, Melbourne.

2.2 Productivity (PI-type) indicator methods

The Productivity (PI-type) Indicator is was designed to assess Representativeness in relation to a forest habitat productivity gradient. Areas of relatively higher biological productivity are potential areas of source habitat where population birth rates exceed mortality and form the basis for maintenance of habitat 'sinks' from which species have a higher probability of being lost.

The indicator was developed through an assessment of data on eucalypt forest height potential, stratified to reflect the relative contribution of different height classes in different climatic areas based on average annual rainfall.

Eucalypt forest height potential was supplied in the Forestry Tasmania GIS layer of mature eucalypt height potential (see Section 2.1). T

Average annual rainfall classes were derived from spatial data mapping of the land systems of Tasmania (Richley 1978 and subsequent series reports). The rainfall class assigned to the geographic extent of each mapped land system polygon was used for the analysis. The land system mapping recognises 442 land systems mapped in ~2,400 polygons with a mean area of 2,800ha. The resolution of the rainfall classes is relatively coarse but has been designed to nest with other components of the land systems analysis - altitude, geology, topology, soils and vegetation - to reflect landscape scale patterns rather than local variability.

The stratification of the eucalypt forest height potential mapping by rainfall classes was used to derive a threshold level of impotence for Representativeness for forests that reflects the dominant characteristics of the landscape in which they occur. For example, forests with a height potential of 27-34m in a dry area are relatively uncommon and are likely to contribute more to Representativeness in those areas than the same height class in a wet areas dominated by much taller forests.

Table 1 shows the classes of rainfall and height potential that define the threshold for Representativeness for the Productivity (PI-type) indicator in different area.

Table 1. Threshold levels and classes for Productivity (PI-type) indicator

Productivity class	Rainfall (average annual)	Eucalypt height potential
1	<500mm	>27m
2	500 - 1,000m	>34m
3	1,000 - 2, 000mm	>41m
4	>2,000mm	>34m

The use of a lower height threshold in areas of >2,000mm rainfall reflects the reduction in forest height in very wet areas that arise from the effects of rainfall on soil formation, movement and fertility.

The Productivity (PI-type) indicator was calculated as the percentage area of forests within each ENGO forest polygon that exceeded the threshold.

2.3 Representativeness (Clearing Bias) indicator methods

The Representativeness (Clearing Bias) indicator provides an assessment of the extent to which options for achieving representation of finer scale environmental variation may have been foreclosed or limited by past land clearing patterns. The magnitude and pattern of habitat loss can disrupt regional ecosystem processes, including crossing thresholds for habitat loss that lead to ecosystem collapse (see, for example, Mac Nally et al. 2009[21]).

The indicator was developed using the land components data described in Section 2.1. The data included a calculation of the percentage area of each land component (n=~2,400) that has been cleared of native vegetation. For example, if 30% of the entire extent of a land component has been cleared then a Clearing Bias of 30% applies to mapped occurrences. There is no differentiation between mapped polygons of the same land component.

These data formed part of the integrated GIS layer developed for the Representativeness analysis, and provide a continuous cover of Clearing Bias across all land in Tasmania

The indicator for the IVG work was designed to assess the relative extent to which the ENGO forest polygons include land components with higher levels of Clearing Bias. The approach assumed that the Representativeness of extant forest areas increases with increases in underlying Clearing Bias, as the remaining forest areas form a reduced set of options for including the finer scale variation in the environment in the reserve system.

The following data were generated for each ENGO forest polygon:

- Area of each of four Clearing Bias classes (<30%, 30-70%, 70-90% and >90%);
- Area weighted mean percentage Clearing Bias; and
- Total area with Clearing Bias >70%.

The threshold value of 70% is based on the critical threshold for ecosystem decline reported by James and Saunders (2001). The area of ENGO forest polygons with such high Clearing Bias is small; however these areas are likely to be important for securing Representativeness due to the potentially small pool of options.

[21] MacNally, R., Bennett, A.F., Thomson, J.R., Radford, J.Q., Unmack, G., Horrocks, G. & Vesk, P.A. (2009). Collapse of an avifauna: climate change appears to exacerbate habitat loss & degradation. Diversity & Distributions, 15(4):720-730.

3. Summary of results

The results of the work described in Section 2 are contained in a relatively large and complex GIS data layer. The layer should be referred to for detailed assessment of the results of the work. Summaries of each of the analyses are presented below.

3.1 Results of Productivity (PI-type) indicator assessment

Table 2 provides a summary of the area of each of the productivity classes derived for the indicator, along with their area existing NRS reserves in the ENGO forest polygons. The area of each class in non-NRS reserves and in ENGO forest polygons which include non-NRS reserves is also shown.

Table 2. Summary of productivity class areas and reservation

Productivity class	Total area (ha)	NRS (ha)	NRS (%)	ENGO (ha)	NRS + ENGO (ha)	NRS + ENGO (%)	Other reserves (ha)	ENGO in other reserves (ha)
0 (below threshold)	2,073,353	711,741	34.3	235,660	235,694	45.7	155,091	76,566
1	312	32	10.3	0	10	10.3	0	0
2	211,698	32,006	15.1	33,818	33,833	31.1	24,462	9,749
3	434,695	100,611	23.1	116,811	116,834	50.0	54,727	27,194
4	161,275	86,935	53.9	24,329	24,383	69.0	16,468	8,354
Total 1 - 4 (above threshold)	807,981	219,584	27.2	174,958	174,985	48.8	95,657	45,297

Table 4 (after Section 3.2) provides a ranked summary of each of the ENGO forest polygons by area above the indicator threshold, and also the percentage total of area above the indicator threshold. Attachment 2 includes a breakdown of each ENGO forest polygon by the productivity classes of the indicator. Attachment 3 provides a map of percentage area of eucalypt forest in each ENGO forest polygon that meets the threshold criteria for the indicato.

3.2 Results of Representativeness (Clearing Bias) indicator assessment

Table 3 provides a summary of the area of each of the productivity classes derived for the indicator, along with their area existing NRS reserves in the ENGO forest polygons. The area of each class in non-NRS reserves and in ENGO forest polygons which include non-NRS reserves is also shown.

Table 3. Summary of Clearing Bias class areas and reservation

Clearing bias class	Total area (ha)	NRS (ha)	NRS (%)	ENGO (ha)	NRS + ENGO (ha)	NRS + ENGO (%)	Other reserves (ha)	ENGO in other reserves (ha)
<30%	4,535,776	2,456,456	54.2	510,043	2,966,499	65.4	318,023	191,815
30-70%	1,395,246	134,559	9.6	51,657	186,216	13.3	66,843	13,577
70-90%	295,166	13,751	5.3	770	14,327	5.3	5,122	423
>90%	494,023	886	0.2	1,392	2,278	0.5	1,441	1
Clearing bias >70%	753,189	14,637	1.9	2,162	16,605	2.2	6,563	424

Table 4 provides a ranked summary of each of the ENGO forest polygons by descending order of area weighted mean clearing bias, and also the area of land components with a Clearing Bias >70%.

Attachment 2 includes a breakdown of each ENGO forest polygon in each of four Clearing Bias classes.

Table 4. ENGO forest polygons ranked by Productivity (PI-type) area and percent and Representativeness (Clearing Bias) area-weighted mean and area above 70% Clearing Bias

Notes to the table 4:
"Rep. PI-type (ha)' ranks ENGO forest polygons in descending order of area of forest that meets the threshold for the Productivity indicator.
"Rep. PI-type (%)" ranks ENGO forest polygons in descending order based on the percentage of their forest area that meets the threshold for the productivity indicator.
"Cl. Bias AWM (%)" ranks ENGO forest polygons in descending order based on their area-weighted mean percentage Clearing Bias.
"Cl. Bias > 70% (ha)" ranks ENGO forest polygons in descending order of their area on land components with a Clearing Bias >70%.

ENGO forest polygon	Rep. PI-type (ha)	ENGO forest polygon	Rep. PI-type (%)	ENGO forest polygon	Cl. Bias AWM (%)	ENGO forest polygon	Cl. Bias >70% (ha)
25	38,998	4	100.0	135	75.2	268	281
252	17,473	6	100.0	131	69.5	252	162
198	8,667	11	100.0	139	68.0	156	126
258	6,952	12	100.0	253	67.9	188	120
33	6,906	16	100.0	162	65.6	208	86
208	6,634	28	100.0	206	59.4	197	78
5	5,357	31	100.0	260	57.6	236	63
54	4,638	36	100.0	134	56.2	239	57
44	3,315	131	100.0	251	55.9	269	48
193	3,238	144	100.0	172	52.3	162	44
2	3,140	146	100.0	109	51.6	196	32
156	2,485	152	100.0	118	48.0	25	31
29	2,471	179	100.0	195	46.8	218	31
35	2,386	200	100.0	165	46.1	249	27
268	2,088	202	100.0	177	44.9	136	27
136	1,961	205	100.0	232	42.7	195	26
123	1,905	210	100.0	144	42.5	184	18
176	1,821	213	100.0	218	41.1	118	18
14	1,796	216	100.0	108	40.2	211	18
13	1,773	222	100.0	189	39.9	237	17
26	1,740	227	100.0	229	39.9	238	14
249	1,724	241	100.0	267	39.8	229	13
3	1,707	242	100.0	261	39.7	260	13
30	1,647	246	100.0	28	38.8	255	10
39	1,636	248	100.0	226	37.7	193	9
112	1,569	259	100.0	247	37.6	141	9
244	1,516	263	100.0	173	37.0	187	9
87	1,476	265	100.0	242	37.0	163	9
58	1,293	96	99.7	204	36.7	257	9
197	1,287	187	98.0	170	36.4	137	8
257	1,239	26	97.7	233	35.5	243	7

ENGO forest polygon	Rep. PI-type (ha)	ENGO forest polygon	Rep. PI-type (%)	ENGO forest polygon	Cl. Bias AWM (%)	ENGO forest polygon	Cl. Bias >70% (ha)
45	1,237	261	96.8	161	34.8	5	7
81	1,138	13	96.2	114	34.6	183	7
19	1,017	32	96.0	174	34.3	224	6
224	982	20	95.3	188	34.3	235	5
17	949	18	94.1	211	33.3	115	5
187	881	24	93.1	231	33.2	212	4
269	846	249	92.5	265	32.9	139	3
12	814	73	91.3	225	32.6	258	3
239	808	19	90.9	185	32.4	247	3
127	784	250	90.6	128	31.9	114	3
229	767	37	90.3	147	31.5	204	2
237	732	224	89.8	175	31.4	189	2
125	700	229	89.4	237	31.1	226	2
113	688	14	88.8	155	30.6	97	2
20	671	269	88.0	180	29.6	173	2
181	661	254	87.6	223	29.2	209	2
236	631	5	87.2	193	28.9	266	1
130	610	211	86.8	133	28.8	127	1
34	610	221	86.2	263	28.7	135	1
166	518	247	85.0	153	28.5	131	0
233	497	30	83.2	266	28.4	142	0
93	496	220	82.7	168	27.7	225	0
97	434	99	82.6	235	27.1	259	0
212	414	47	82.5	224	26.9	134	0
106	403	238	82.5	163	26.7	254	0
207	394	257	82.4	4	26.7	1	0
111	390	35	80.1	186	26.6	2	0
78	375	158	78.9	179	26.5	3	0
250	374	9	78.2	178	26.5	4	0
68	369	219	77.0	236	26.2	6	0
76	365	43	75.8	217	25.9	7	0
149	364	162	75.8	221	25.7	8	0
23	364	237	73.1	216	25.6	9	0
238	348	198	72.7	154	25.2	10	0
119	343	25	72.3	164	25.2	11	0
243	341	71	71.7	7	25.1	12	0
66	339	8	69.0	228	24.9	13	0
196	320	34	68.4	209	24.8	14	0
65	319	2	68.1	207	24.7	15	0
234	314	153	68.1	197	24.5	16	0
225	311	104	67.6	201	24.5	17	0
115	287	23	66.0	205	23.9	18	0

ENGO forest polygon	Rep. PI-type (ha)	ENGO forest polygon	Rep. PI-type (%)	ENGO forest polygon	Cl. Bias AWM (%)	ENGO forest polygon	Cl. Bias >70% (ha)
221	282	136	65.9	230	23.7	19	0
18	281	3	64.4	258	23.5	20	0
8	279	266	62.6	187	23.2	21	0
137	274	226	61.4	250	22.5	22	0
211	273	29	58.2	243	22.5	23	0
183	272	132	57.4	160	22.5	24	0
264	270	112	57.3	220	22.4	26	0
186	253	182	57.2	116	21.5	27	0
226	251	45	57.0	31	20.7	28	0
102	247	33	53.3	150	20.2	29	0
259	245	209	51.5	127	20.1	30	0
107	230	233	51.0	8	20.0	31	0
7	220	183	50.6	17	19.9	32	0
74	219	114	50.5	222	19.5	33	0
219	207	208	50.2	156	19.3	34	0
227	206	268	50.2	240	19.1	35	0
104	206	51	50.1	169	19.0	36	0
114	200	91	50.1	208	18.0	37	0
254	197	44	49.4	202	17.8	38	0
247	194	252	49.0	210	17.6	39	0
245	193	175	48.1	200	17.6	40	0
184	193	166	47.6	146	17.2	41	0
51	188	54	47.1	194	17.1	42	0
173	160	130	44.8	213	16.9	43	0
209	159	7	44.0	238	16.3	44	0
188	158	234	43.7	245	16.2	45	0
140	157	267	43.3	166	16.1	46	0
110	145	147	42.6	115	16.0	47	0
150	142	17	42.0	264	15.7	48	0
22	140	87	41.4	22	15.6	49	0
43	132	164	40.8	90	15.5	50	0
205	129	56	40.7	9	15.4	51	0
154	115	244	39.8	125	15.3	52	0
146	114	176	39.1	21	14.9	53	0
126	99	40	39.0	136	14.6	54	0
182	96	258	37.8	241	14.5	55	0
158	94	109	36.3	84	14.5	56	0
132	93	196	35.3	13	14.4	57	0
32	92	119	34.9	190	14.1	58	0
37	91	140	33.6	26	14.0	59	0
242	89	105	32.9	227	14.0	60	0
263	89	10	32.6	215	13.6	61	0

ENGO forest polygon	Rep. PI-type (ha)	ENGO forest polygon	Rep. PI-type (%)	ENGO forest polygon	Cl. Bias AWM (%)	ENGO forest polygon	Cl. Bias >70% (ha)
60	87	58	32.2	269	13.4	62	0
174	82	156	31.7	214	13.4	63	0
148	76	107	31.6	29	12.8	64	0
103	75	81	31.3	11	12.7	65	0
10	72	22	31.2	196	12.6	66	0
24	71	21	30.6	183	12.0	67	0
82	69	181	29.7	249	12.0	68	0
200	66	243	28.4	59	11.8	69	0
267	60	204	28.3	268	11.8	70	0
191	60	53	27.6	159	11.6	71	0
46	58	188	27.5	142	11.4	72	0
117	58	102	27.1	254	11.2	73	0
199	58	236	27.0	182	11.1	74	0
91	56	149	26.7	106	10.8	75	0
164	56	27	26.0	184	10.8	76	0
122	55	197	25.3	33	10.7	77	0
261	54	225	24.9	5	10.4	78	0
203	54	38	24.4	152	9.9	79	0
162	52	49	24.4	35	9.7	80	0
11	51	122	23.9	110	9.6	81	0
73	50	174	23.4	57	9.5	82	0
202	47	199	23.4	43	9.5	83	0
27	47	207	23.2	129	9.4	84	0
240	44	193	23.1	24	9.1	85	0
147	42	127	22.2	203	8.9	86	0
194	42	41	21.8	120	8.9	87	0
204	38	194	21.8	27	8.8	88	0
216	37	76	21.1	67	8.8	89	0
241	34	125	21.1	121	8.7	90	0
175	33	148	21.0	212	8.6	91	0
129	32	173	20.9	239	8.4	92	0
159	31	110	20.8	37	8.4	93	0
31	31	74	20.6	244	8.4	94	0
213	31	82	20.4	145	8.4	95	0
47	30	178	20.2	48	8.3	96	0
120	26	68	20.1	140	8.1	98	0
9	25	65	19.3	167	8.0	99	0
40	24	240	18.5	46	7.8	100	0
21	23	203	18.2	151	7.7	101	0
266	22	159	17.7	192	7.5	102	0
152	20	191	17.7	141	7.3	103	0
41	20	154	17.5	51	7.2	104	0

ENGO forest polygon	Rep. PI-type (ha)	ENGO forest polygon	Rep. PI-type (%)	ENGO forest polygon	Cl. Bias AWM (%)	ENGO forest polygon	Cl. Bias >70% (ha)
217	15	60	17.3	39	7.2	105	0
220	15	123	17.1	176	7.2	106	0
265	13	39	16.9	234	7.1	107	0
235	13	106	16.6	259	7.1	108	0
16	13	111	15.5	14	7.0	109	0
105	13	42	15.4	198	6.8	110	0
192	12	113	15.3	246	6.7	111	0
53	11	115	14.7	117	6.5	112	0
178	11	192	14.4	111	6.5	113	0
42	11	186	14.2	199	6.3	116	0
71	10	212	14.0	138	6.2	117	0
56	9	239	13.7	36	6.0	119	0
96	9	184	12.9	25	6.0	120	0
246	9	206	12.0	68	5.9	121	0
116	8	137	11.1	130	5.8	122	0
222	8	264	10.9	119	5.8	123	0
189	8	93	10.6	64	5.8	124	0
141	7	117	10.3	49	5.6	125	0
49	7	189	10.3	38	5.6	126	0
38	6	78	10.1	76	5.5	128	0
4	6	66	9.8	81	5.5	129	0
28	5	126	7.2	60	5.4	130	0
36	4	138	7.1	219	5.4	132	0
153	4	235	6.0	148	5.3	133	0
179	3	245	5.0	82	5.0	138	0
144	3	120	4.7	93	4.9	140	0
6	2	150	4.6	191	4.7	143	0
99	2	103	4.5	63	4.7	144	0
206	1	116	4.2	252	4.7	145	0
151	1	97	3.9	55	4.5	146	0
124	1	46	3.2	126	4.4	147	0
131	1	129	2.9	47	4.3	148	0
70	1	217	2.6	41	3.7	149	0
101	0	101	2.3	16	3.7	150	0
109	0	141	1.8	23	3.7	151	0
248	0	70	1.2	45	3.6	152	0
138	0	151	1.2	6	3.6	153	0
210	0	124	0.6	248	3.5	154	0
171	0	1	0.0	158	3.5	155	0
1	0	15	0.0	123	3.4	157	0
15	0	48	0.0	40	3.4	158	0
48	0	50	0.0	53	3.3	159	0

ENGO forest polygon	Rep. PI-type (ha)	ENGO forest polygon	Rep. PI-type (%)	ENGO forest polygon	Cl. Bias AWM (%)	ENGO forest polygon	Cl. Bias >70% (ha)
50	0	52	0.0	171	3.3	160	0
52	0	55	0.0	122	3.3	161	0
55	0	57	0.0	42	3.2	164	0
57	0	59	0.0	181	3.1	165	0
59	0	61	0.0	77	3.0	166	0
61	0	62	0.0	56	3.0	167	0
62	0	63	0.0	12	2.9	168	0
63	0	64	0.0	69	2.9	169	0
64	0	67	0.0	62	2.8	170	0
67	0	69	0.0	72	2.8	171	0
69	0	72	0.0	157	2.7	172	0
72	0	75	0.0	61	2.6	174	0
75	0	77	0.0	257	2.6	175	0
77	0	79	0.0	103	2.6	176	0
79	0	80	0.0	65	2.6	177	0
80	0	83	0.0	101	2.5	178	0
83	0	84	0.0	143	2.4	179	0
84	0	85	0.0	66	2.3	180	0
85	0	86	0.0	113	2.3	181	0
86	0	88	0.0	80	2.2	182	0
88	0	89	0.0	104	2.2	185	0
89	0	90	0.0	137	2.1	186	0
90	0	92	0.0	87	2.0	190	0
92	0	94	0.0	79	1.9	191	0
94	0	95	0.0	100	1.8	192	0
95	0	98	0.0	2	1.8	194	0
98	0	100	0.0	99	1.7	198	0
100	0	108	0.0	107	1.7	199	0
108	0	118	0.0	1	1.7	200	0
118	0	121	0.0	102	1.7	201	0
121	0	128	0.0	88	1.6	202	0
128	0	133	0.0	149	1.5	203	0
133	0	134	0.0	89	1.5	205	0
134	0	135	0.0	105	1.5	206	0
135	0	139	0.0	32	1.5	207	0
139	0	142	0.0	124	1.4	210	0
142	0	143	0.0	50	1.3	213	0
143	0	145	0.0	112	1.3	214	0
145	0	155	0.0	34	1.2	215	0
155	0	157	0.0	92	1.1	216	0
157	0	160	0.0	15	1.1	217	0
160	0	161	0.0	70	0.9	219	0

ENGO forest polygon	Rep. PI-type (ha)	ENGO forest polygon	Rep. PI-type (%)	ENGO forest polygon	Cl. Bias AWM (%)	ENGO forest polygon	Cl. Bias >70% (ha)
161	0	163	0.0	71	0.9	220	0
163	0	165	0.0	86	0.8	221	0
165	0	167	0.0	19	0.8	222	0
167	0	168	0.0	96	0.6	223	0
168	0	169	0.0	98	0.5	227	0
169	0	170	0.0	75	0.5	228	0
170	0	171	0.0	132	0.4	230	0
172	0	172	0.0	83	0.4	231	0
177	0	177	0.0	78	0.3	232	0
180	0	180	0.0	85	0.2	233	0
185	0	185	0.0	74	0.1	234	0
190	0	190	0.0	73	0.1	240	0
195	0	195	0.0	91	0.1	241	0
201	0	201	0.0	3	0.0	242	0
214	0	214	0.0	10	0.0	244	0
215	0	215	0.0	18	0.0	245	0
218	0	218	0.0	20	0.0	246	0
223	0	223	0.0	30	0.0	248	0
228	0	228	0.0	44	0.0	250	0
230	0	230	0.0	52	0.0	251	0
231	0	231	0.0	54	0.0	253	0
232	0	232	0.0	58	0.0	256	0
251	0	251	0.0	94	0.0	261	0
253	0	253	0.0	95	0.0	262	0
255	0	255	0.0	97	0.0	263	0
256	0	256	0.0	255	0.0	264	0
260	0	260	0.0	256	0.0	265	0
262	0	262	0.0	262	0.0	267	0
270	0	270	0.0	270	0.0	270	0

4. Attachments

Attachment 1
Metadata for Tasmanian land components spatial data

Key to field ins: Lsys+lctpi29-1.shp

Date prepared: 21 December 2010
Date modified: 4 December 2011

Description: Synthetic land components for Tasmania combining 6 class landform classification derived from 25m DEM with boundaries of mapped land systems.

Format: ESRI shapefile

Derivation: Landform classification is an input from LCTPI_200m-29.shp. Landforms have been classified from a 25m DEM for Tasmania using the Topographic Position Index extension for ArcView 3.x (http://www.jennessent.com/arcview/tpi.htm) with parameters developed for use in Tasmanian landscapes. The data was initially processed to eight classes and then reduced to six. The data was initially processed to a grid prior to conversion to polygons. Polygon version of the data has been iterated to successively dissolve smaller polygons into larger polygons until a minimum polygon size of 2ha has been obtained.

The landform polygons have been geoprocessed with the mapped land systems boundaries for Tasmania (Lsys_merged_gda.shp). A separate folder of .pdf files contains descriptions and profiles of land systems from published reports (provided with this data). Polygons <2ha arising from geoprocessing have been dissolved back to their progenitor in the input data from LCTPI_200m-29m.shp, except where coastal and outside the land system classification (see Known issues).

License conditions: The data layer is an NRP proprietal layer and is available for use for approved purposes only. Written authorisation from NRP is required. Unauthorised copying or use is strictly prohibited.

Known issues:
1. A small number of polygons (n=205) remain under the 2ha threshold and have not been resolved.
2. External boundaries (i.e. coastline) of the landforms and land systems data are not co-incident with each other or finer scale (1:25k) definition of the Tasmanian land area, resulting in small anomalies around the coastline.

3. Areas mapped in the landforms data but not in the land systems data have been retained and are coded with the land system number 999999.
4. Areas of larger inland waterbodies are not mapped in the land systems data. These are coded with a land system number of -999999. Landforms have been classified in these areas but classes represent anomalies in the interpretation of the DEM and should be excluded from any analysis. Many of these are waterbodies but their origin (natural or anthropogenic) has not been determined.
5. More recent and detailed mapping of soils and geology are available in some areas mean that the boundaries of the land systems need updating (partially completed in Lcomps_master_current.shp). This means the data is suitable for analysis of broad areas but the external boundaries should not be used for mapping purposes.

Field types:
No explanation required for this layer.

Field	Type	Length*[22]	Field type	Description	Notes
Id	Integer	10	Control	Id of the input polygon from LCTPI_200m-29.shp	
Gridcode	Integer	10	Primary	Integer code for the landform classes.	
Area_ha	Decimal	12.3	Control	Area of the input polygon from LCTPI_200m-29.shp, prior to any geoprocessing.	
Sublayer	String	20	Miscellaneous	Field used for manipulating subsets of the data.	
Landform	String	30	Derived	Text of the landforms class, based on the value of [Gridcode]	Landform codes are: EP - Elevated plains; US - Crests, ridges and upper slopes; SM - Steep midslopes; GL - Gentle lower slopes; LP - Lower plains; and SL - Steep lower slopes.
Lsys_nameZ	String	32	Primary	Name of the land system corresponding to the numeric code in [LandsysnuZ]	There are 443 land systems. Names are as per published land systems reports (see below).

[22] * Decimal fields are expresses as n1.n2, where n1 is the total field length, including decimal point, and n2 the number of decimal places

Field	Type	Length*[22]	Field type	Description	Notes
LS_uniqnuZ	Integer	4	Control	Unique number of the land system input polygon in Landsys_merged_gda.shp	
LandsysnuZ	Integer	8	Primary	Six digit code for land system.	Land system codes are a concatenation of numeric codes for (in order) rainfall, geological period, rock type (or parent), altitude, and topography(see see below), with the sixth digit identifying variants based on soils and vegetation.
Lsys_haZ	Decimal	12.3	Control	Area of the input polygon defined by [Ls_uniqnuZ]	
LSLC_combo	Integer	7	Derived	Concatenation of [LandsysnuZ] and [Gridcode] to provide a unique number for each combination of land system and landform.	
Lcomp_txt	String	9	Derived	Text field for the field [LCLC_comb] indicating the six digit land system code and a 2 letter code for each landform.	
Clbias_pcZ	Decimal	5.1	Derived	Clearing bias for each land component defined by the field [LCLC_combo], representing the total area of each component that has been cleared.	Derived from an intersection of this data layer with simplified vegetation (native or cleared) to generate Clearing Bias for each component. Note that the same clearing bias applies to all polygons of the same land component, not to individual polygons.

References for Tasmanian land systems reports

Richley, L.R. (1984). Land systems of Tasmania region 1. Department of Agriculture, Tasmania.
(King Island)

Pinkard, G.J. & Richley, L.R. (1982). Land systems of Tasmania region 2. Tasmanian Department of Agriculture.
(Furneaux islands)

Richley, L.R. (1978). Land systems of Tasmania region 3. Tasmanian Department of Agriculture, Hobart.
(North west Tasmania)

Pinkard, G.J. (1980). Land systems of Tasmania region 4. Tasmanian Department of Agriculture, Hobart.
(North east Tasmania)

Pemberton, M. (1986). Land systems of Tasmania region 5 - Central Plateau. Department of Agriculture, Tasmania.

Davies, J. B. (1988). Land systems of Tasmania, Region 6: South, East and Midlands. Department of Agriculture, Hobart.

Pemberton, M. (1989). Land systems of Tasmania, Region 7: South West. Department of Agriculture, Hobart.

Key to land systems numerical coding

Land systems are defined by a unique 6 digit code for each land system (see field [LandsysnuZ]).

Each land system code is constructed as follows.

First digit - Approximate average annual rainfall

1. <500mm;
2. 500 - 625mm;
3. 625 - 750mm;
4. 750 - 1,000mm;
5. 1,000 - 1,250mm
6. 1,250 - 1,500mm;
7. 1,500 - 2,000mm;
8. 2,000 - 2,500mm; and
9. >2,500mm

Second digit - Geological period

1. Precambrian;
2. Cambrian;
3. Ordovician;
4. Silurian and Devonian;
5. Lower Devonian - Tremadocian;
6. Carboniferous and Permian;
7. Triassic and Jurassic;
8. Tertiary; and
9. Quaternary.

Third digit - Rock type (or parent material of Quaternary deposits)

1. Acid igneous (e.g. granite);
2. Basic igneous (e.g. basalt, dolerite);
3. Sedimentary arenaceous (e.g. sandstone);
4. Sedimentary argillaceous (e.g. mudstone);
5. Sedimentary calcareous (e.g. limestone, dolomite);
6. Sedimentary rudaceous (e.g. conglomerate);
7. Metamorphic (e.g. quartzite, schist); and
8. Complexes of the above and/or peat deposits.

Fourth digit - Altitudinal range

1. <300m;
2. 300 - 600m;
3. 600 - 900m;
4. 900 - 1,200m;
5. 1,200 - 1,500m; and
6. 1,500 - 1800m.

Fifth digit - Topography

1. Flat plains;
2. Undulating plains;
3. Low hills (<100m);
4. Hills (100-300m);
5. Mountains (>300m); and
6. Coastal dunes and beaches.

Sixth digit - soil and vegetation variants

This is used as a means of separating land systems generally based on variation in soils and vegetation where the first five digits are identical.

Attachment 2
Breakdown of ENGO forest polygons by Representativeness indicator classes

Key to column headings
Note that small differences in sums of area in the table arise from different processing methods and data sources.

ENGO forest polygon base data:

ENGO forest polygon - Unique identifier for the ENGO forest polygon (used throughout all IVG analyses).

ENGO area (ha) - Total area of the ENGO forest polygon.

Forest area (ha) - Area of forest ecosystems within ENGO forest polygon.

Productivity (PI-type) indicator data:

PI-type 0 - Area of ENGO forest polygon either non-forest or forest below indicator threshold.
PI-type 1 - Area which is in indicator productivity class 1, i.e. rainfall <500 and eucalypt height potential >27m.
PI-type 2 - Area which is in indicator productivity class 2, i.e. rainfall 500 - 1,000mm and eucalypt height potential >34m.
PI-type 3 - Area which is in indicator productivity class 3, i.e. rainfall 1,000 - 2,000mm and eucalypt height potential >41m.
PI-type 4 - Area which is in indicator productivity class 4, i.e. rainfall >2,000mm and eucalypt height potential >34m.

Rep. PI-type - Total area of ENGO forest polygon above the threshold for the indicator, i.e. sum of PI-type 1 ... PI-type 4.

Rep. PI-type (%) - Percent area of ENGO forest polygon above threshold for indicator.

Representativeness (Clearing Bias) indicator data:

Cl. Bias <30% Area of ENGO forest polygon with Clearing Bias <30%.
Cl. Bias 30-70% Area with Clearing Bias 30-70%.
Cl. Bias 70-90% Area with Clearing Bias 70-90%.
Cl. Bias >90% Area with Clearing Bias >90%.

Cl. Bias AWM (%) - Area weighted mean Clearing Bias for ENGO forest polygon.
Cl. Bias >70% - Total area of ENGO forest polygon with Clearing Bias >70%.

ENGO forest polygon	ENGO area (ha)	Forest area (ha)	PI-type 0	PI-type 1	PI-type 2	PI-type 3	PI-type 4	Rep. PI-type	Rep. PI-type (%)	Cl. Bias <30%	Cl. Bias 30-70%	Cl. Bias 70-90%	Cl. Bias >90%	Cl. Bias AWM (%)	Cl. Bias >70%
1	13	12	11	0	0	0	0	***0***	***0.0***	13	0	0	0	***1.7***	***0***
2	5,257	4,725	1,472	0	0	3,140	0	***3,140***	***68.1***	5,255	0	0	0	***1.8***	***0***
3	2,686	2,630	943	0	0	1,707	0	***1,707***	***64.4***	2,681	2	0	0	***0.0***	***0***
4	6	6	0	0	6	0	0	***6***	***100.0***	6	0	0	0	***26.7***	***0***
5	6,338	5,500	787	0	5,357	0	0	***5,357***	***87.2***	5,672	660	7	0	***10.4***	***7***
6	2	1	0	0	0	2	0	***2***	***100.0***	2	0	0	0	***3.6***	***0***
7	499	463	279	0	220	0	0	***220***	***44.0***	297	202	0	0	***25.1***	***0***
8	412	403	125	0	279	0	0	***279***	***69.0***	316	97	0	0	***20.0***	***0***
9	31	29	7	0	25	0	0	***25***	***78.2***	31	0	0	0	***15.4***	***0***
10	227	223	150	0	72	0	0	***72***	***32.6***	216	10	0	0	***0.0***	***0***
11	51	47	0	0	0	51	0	***51***	***100.0***	51	0	0	0	***12.7***	***0***
12	820	799	0	0	814	0	0	***814***	***100.0***	793	27	0	0	***2.9***	***0***
13	1,870	1,867	71	0	18	1,754	0	***1,773***	***96.2***	1,869	0	0	0	***14.4***	***0***
14	2,047	1,943	227	0	1,796	0	0	***1,796***	***88.8***	1,878	168	0	0	***7.0***	***0***
15	0	0	0	0	0	0	0	***0***	***0.0***	0	0	0	0	***1.1***	***0***
16	13	13	0	0	0	13	0	***13***	***100.0***	13	0	0	0	***3.7***	***0***
17	2,301	2,114	1,309	0	949	0	0	***949***	***42.0***	1,569	732	0	0	***19.9***	***0***
18	389	341	17	0	0	11	269	***281***	***94.1***	381	0	0	0	***0.0***	***0***
19	2,665	2,304	102	0	0	69	948	***1,017***	***90.9***	2,664	0	0	0	***0.8***	***0***
20	794	762	33	0	0	0	671	***671***	***95.3***	790	0	0	0	***0.0***	***0***
21	76	76	53	0	23	0	0	***23***	***30.6***	75	1	0	0	***14.9***	***0***
22	448	445	308	0	140	0	0	***140***	***31.2***	420	27	0	0	***15.6***	***0***
23	1,034	678	187	0	0	88	275	***364***	***66.0***	1,034	0	0	0	***3.7***	***0***
24	76	77	5	0	0	71	0	***71***	***93.1***	77	0	0	0	***9.1***	***0***
25	60,345	56,716	14,918	0	586	38,412	0	***38,998***	***72.3***	59,144	1,171	31	0	***6.0***	***31***

ENGO forest polygon	ENGO area (ha)	Forest area (ha)	PI-type 0	PI-type 1	PI-type 2	PI-type 3	PI-type 4	Rep. PI-type	Rep. PI-type (%)	Cl. Bias <30%	Cl. Bias 30-70%	Cl. Bias 70-90%	Cl. Bias >90%	Cl. Bias AWM (%)	Cl. Bias >70%
26	1,874	1,846	41	0	160	1,533	47	***1,740***	***97.7***	1,837	36	0	0	***14.0***	***0***
27	188	163	132	0	47	0	0	***47***	***26.0***	188	0	0	0	***8.8***	***0***
28	13	13	0	0	5	0	0	***5***	***100.0***	7	7	0	0	***38.8***	***0***
29	4,418	4,216	1,775	0	2,471	0	0	***2,471***	***58.2***	3,929	489	0	0	***12.8***	***0***
30	2,775	2,202	331	0	0	0	1,647	***1,647***	***83.2***	2,751	0	0	0	***0.0***	***0***
31	74	67	0	0	0	31	0	***31***	***100.0***	71	3	0	0	***20.7***	***0***
32	146	146	4	0	0	92	0	***92***	***96.0***	146	0	0	0	***1.5***	***0***
33	15,776	13,910	6,063	0	133	6,083	691	***6,906***	***53.3***	15,711	63	0	0	***10.7***	***0***
34	927	899	282	0	0	610	0	***610***	***68.4***	927	0	0	0	***1.2***	***0***
35	3,026	2,933	592	0	0	2,227	160	***2,386***	***80.1***	3,022	5	0	0	***9.7***	***0***
36	6	5	0	0	0	4	0	***4***	***100.0***	6	0	0	0	***6.0***	***0***
37	116	103	10	0	0	91	0	***91***	***90.3***	116	0	0	0	***8.4***	***0***
38	25	24	19	0	0	6	0	***6***	***24.4***	25	0	0	0	***5.6***	***0***
39	9,820	9,660	8,070	0	1,636	0	0	***1,636***	***16.9***	9,318	501	0	0	***7.2***	***0***
40	62	54	38	0	24	0	0	***24***	***39.0***	62	0	0	0	***3.4***	***0***
41	91	91	71	0	20	0	0	***20***	***21.8***	91	0	0	0	***3.7***	***0***
42	70	70	59	0	11	0	0	***11***	***15.4***	70	0	0	0	***3.2***	***0***
43	185	179	42	0	0	132	0	***132***	***75.8***	185	0	0	0	***9.5***	***0***
44	8,146	6,571	3,399	0	0	3,019	296	***3,315***	***49.4***	8,131	0	0	0	***0.0***	***0***
45	2,193	2,135	932	0	1,237	0	0	***1,237***	***57.0***	2,193	0	0	0	***3.6***	***0***
46	1,892	1,841	1,785	0	58	0	0	***58***	***3.2***	1,892	0	0	0	***7.8***	***0***
47	36	32	6	0	30	0	0	***30***	***82.5***	36	0	0	0	***4.3***	***0***
48	3	3	3	0	0	0	0	***0***	***0.0***	3	0	0	0	***8.3***	***0***
49	28	26	22	0	7	0	0	***7***	***24.4***	28	0	0	0	***5.6***	***0***
50	461	215	206	0	0	0	0	***0***	***0.0***	461	0	0	0	***1.3***	***0***

ENGO forest polygon	ENGO area (ha)	Forest area (ha)	PI-type 0	PI-type 1	PI-type 2	PI-type 3	PI-type 4	Rep. PI-type	Rep. PI-type (%)	Cl. Bias <30%	Cl. Bias 30-70%	Cl. Bias 70-90%	Cl. Bias >90%	Cl. Bias AWM (%)	Cl. Bias >70%
51	445	376	188	0	188	0	0	***188***	***50.1***	445	0	0	0	***7.2***	***0***
52	9,496	6,928	2,216	0	0	0	0	***0***	***0.0***	9,443	3	0	0	***0.0***	***0***
53	41	41	30	0	11	0	0	***11***	***27.6***	41	0	0	0	***3.3***	***0***
54	11,519	9,587	5,205	0	0	3,701	937	***4,638***	***47.1***	11,510	5	0	0	***0.0***	***0***
55	21	21	21	0	0	0	0	***0***	***0.0***	21	0	0	0	***4.5***	***0***
56	22	22	13	0	9	0	0	***9***	***40.7***	22	0	0	0	***3.0***	***0***
57	7	7	7	0	0	0	0	***0***	***0.0***	7	0	0	0	***9.5***	***0***
58	5,862	4,192	2,728	0	0	1,051	243	***1,293***	***32.2***	5,799	0	0	0	***0.0***	***0***
59	1,159	997	93	0	0	0	0	***0***	***0.0***	1,119	40	0	0	***11.8***	***0***
60	510	510	417	0	87	0	0	***87***	***17.3***	510	0	0	0	***5.4***	***0***
61	137	62	0	0	0	0	0	***0***	***0.0***	137	0	0	0	***2.6***	***0***
62	113	88	0	0	0	0	0	***0***	***0.0***	113	0	0	0	***2.8***	***0***
63	11	11	10	0	0	0	0	***0***	***0.0***	11	0	0	0	***4.7***	***0***
64	214	212	84	0	0	0	0	***0***	***0.0***	214	0	0	0	***5.8***	***0***
65	1,672	1,583	1,328	0	319	0	0	***319***	***19.3***	1,651	21	0	0	***2.6***	***0***
66	4,492	3,493	3,131	0	0	339	0	***339***	***9.8***	4,487	4	0	0	***2.3***	***0***
67	9	8	1	0	0	0	0	***0***	***0.0***	9	0	0	0	***8.8***	***0***
68	1,889	1,767	1,472	0	369	0	0	***369***	***20.1***	1,888	0	0	0	***5.9***	***0***
69	1,376	858	67	0	0	0	0	***0***	***0.0***	1,376	0	0	0	***2.9***	***0***
70	49	49	48	0	1	0	0	***1***	***1.2***	49	0	0	0	***0.9***	***0***
71	22	13	4	0	10	0	0	***10***	***71.7***	22	0	0	0	***0.9***	***0***
72	1	1	1	0	0	0	0	***0***	***0.0***	1	0	0	0	***2.8***	***0***
73	55	55	5	0	50	0	0	***50***	***91.3***	55	0	0	0	***0.1***	***0***
74	1,262	1,108	843	0	219	0	0	***219***	***20.6***	1,262	0	0	0	***0.1***	***0***
75	368	350	348	0	0	0	0	***0***	***0.0***	368	0	0	0	***0.5***	***0***

ENGO forest polygon	ENGO area (ha)	Forest area (ha)	PI-type 0	PI-type 1	PI-type 2	PI-type 3	PI-type 4	Rep. PI-type	Rep. PI-type (%)	Cl. Bias <30%	Cl. Bias 30-70%	Cl. Bias 70-90%	Cl. Bias >90%	Cl. Bias AWM (%)	Cl. Bias >70%
76	1,744	1,668	1,362	0	365	0	0	***365***	***21.1***	1,743	0	0	0	***5.5***	***0***
77	15	15	15	0	0	0	0	***0***	***0.0***	15	0	0	0	***3.0***	***0***
78	4,101	3,695	3,328	0	375	0	0	***375***	***10.1***	4,102	0	0	0	***0.3***	***0***
79	619	392	32	0	0	0	0	***0***	***0.0***	619	0	0	0	***1.9***	***0***
80	1,715	1,180	0	0	0	0	0	***0***	***0.0***	1,715	0	0	0	***2.2***	***0***
81	10,107	7,098	2,496	0	0	24	1,114	***1,138***	***31.3***	10,046	61	0	0	***5.5***	***0***
82	338	323	268	0	69	0	0	***69***	***20.4***	338	0	0	0	***5.0***	***0***
83	50	50	50	0	0	0	0	***0***	***0.0***	50	0	0	0	***0.4***	***0***
84	176	172	176	0	0	0	0	***0***	***0.0***	154	22	0	0	***14.5***	***0***
85	16	0	0	0	0	0	0	***0***	***0.0***	16	0	0	0	***0.2***	***0***
86	170	100	170	0	0	0	0	***0***	***0.0***	170	0	0	0	***0.8***	***0***
87	3,696	3,522	2,093	0	1,476	0	0	***1,476***	***41.4***	3,696	0	0	0	***2.0***	***0***
88	1,937	1,751	72	0	0	0	0	***0***	***0.0***	1,937	0	0	0	***1.6***	***0***
89	204	163	0	0	0	0	0	***0***	***0.0***	204	0	0	0	***1.5***	***0***
90	221	149	93	0	0	0	0	***0***	***0.0***	221	0	0	0	***15.5***	***0***
91	155	134	56	0	0	0	56	***56***	***50.1***	155	0	0	0	***0.1***	***0***
92	141	122	0	0	0	0	0	***0***	***0.0***	141	0	0	0	***1.1***	***0***
93	4,841	4,699	4,185	0	496	0	0	***496***	***10.6***	4,841	0	0	0	***4.9***	***0***
94	4	3	4	0	0	0	0	***0***	***0.0***	4	0	0	0	***0.0***	***0***
95	145	79	81	0	0	0	0	***0***	***0.0***	126	0	0	0	***0.0***	***0***
96	18	14	0	0	0	0	9	***9***	***99.7***	18	0	0	0	***0.6***	***0***
97	15,052	10,824	10,690	0	434	0	0	***434***	***3.9***	14,476	449	2	0	***0.0***	***2***
98	2	2	0	0	0	0	0	***0***	***0.0***	2	0	0	0	***0.5***	***0***
99	24	14	0	0	0	0	2	***2***	***82.6***	24	0	0	0	***1.7***	***0***
100	10	9	0	0	0	0	0	***0***	***0.0***	11	0	0	0	***1.8***	***0***

ENGO forest polygon	ENGO area (ha)	Forest area (ha)	PI-type 0	PI-type 1	PI-type 2	PI-type 3	PI-type 4	Rep. PI-type	Rep. PI-type (%)	Cl. Bias <30%	Cl. Bias 30-70%	Cl. Bias 70-90%	Cl. Bias >90%	Cl. Bias AWM (%)	Cl. Bias >70%
101	94	13	19	0	0	0	0	***0***	***2.3***	94	0	0	0	***2.5***	***0***
102	3,950	2,312	667	0	0	0	247	***247***	***27.1***	3,920	25	0	0	***1.7***	***0***
103	1,712	1,658	1,589	0	75	0	0	***75***	***4.5***	1,712	0	0	0	***2.6***	***0***
104	460	373	98	0	0	0	206	***206***	***67.6***	460	0	0	0	***2.2***	***0***
105	65	47	26	0	0	0	13	***13***	***32.9***	65	0	0	0	***1.5***	***0***
106	2,617	2,345	2,032	0	313	90	0	***403***	***16.6***	2,531	86	0	0	***10.8***	***0***
107	784	672	498	0	0	0	230	***230***	***31.6***	784	0	0	0	***1.7***	***0***
108	35	35	28	0	0	0	0	***0***	***0.0***	1	34	0	0	***40.2***	***0***
109	1	1	1	0	0	0	0	***0***	***36.3***	0	1	0	0	***51.6***	***0***
110	741	698	552	0	0	145	0	***145***	***20.8***	737	4	0	0	***9.6***	***0***
111	11,921	9,870	2,125	0	0	195	195	***390***	***15.5***	11,244	677	0	0	***6.5***	***0***
112	3,327	2,819	1,171	0	0	0	1,569	***1,569***	***57.3***	3,321	5	0	0	***1.3***	***0***
113	4,694	4,497	3,818	0	688	0	0	***688***	***15.3***	4,649	45	0	0	***2.3***	***0***
114	434	417	196	0	0	200	0	***200***	***50.5***	198	233	3	0	***34.6***	***3***
115	2,009	1,955	1,668	0	0	287	0	***287***	***14.7***	1,820	185	5	0	***16.0***	***5***
116	206	198	194	0	0	8	0	***8***	***4.2***	157	49	0	0	***21.5***	***0***
117	587	523	507	0	58	0	0	***58***	***10.3***	582	5	0	0	***6.5***	***0***
118	51	36	46	0	0	0	0	***0***	***0.0***	16	18	18	0	***48.0***	***18***
119	1,039	986	640	0	338	5	0	***343***	***34.9***	1,021	18	0	0	***5.8***	***0***
120	742	609	527	0	0	26	0	***26***	***4.7***	741	0	0	0	***8.9***	***0***
121	96	95	84	0	0	0	0	***0***	***0.0***	95	0	0	0	***8.7***	***0***
122	424	380	176	0	0	0	55	***55***	***23.9***	404	20	0	0	***3.3***	***0***
123	11,575	11,020	9,210	0	1,905	0	0	***1,905***	***17.1***	11,575	0	0	0	***3.4***	***0***
124	134	134	132	0	1	0	0	***1***	***0.6***	134	0	0	0	***1.4***	***0***
125	3,664	3,181	2,611	0	0	700	0	***700***	***21.1***	3,281	382	0	0	***15.3***	***0***

ENGO forest polygon	ENGO area (ha)	Forest area (ha)	PI-type 0	PI-type 1	PI-type 2	PI-type 3	PI-type 4	Rep. PI-type	Rep. PI-type (%)	Cl. Bias <30%	Cl. Bias 30-70%	Cl. Bias 70-90%	Cl. Bias >90%	Cl. Bias AWM (%)	Cl. Bias >70%
126	1,414	1,365	1,274	0	70	29	0	***99***	***7.2***	1,408	6	0	0	***4.4***	***0***
127	3,588	3,423	2,742	0	784	0	0	***784***	***22.2***	3,326	261	1	0	***20.1***	***1***
128	12	8	8	0	0	0	0	***0***	***0.0***	3	9	0	0	***31.9***	***0***
129	1,115	1,036	1,082	0	0	32	0	***32***	***2.9***	1,025	90	0	0	***9.4***	***0***
130	2,119	1,979	753	0	0	2	608	***610***	***44.8***	2,067	52	0	0	***5.8***	***0***
131	2	2	0	0	0	1	0	***1***	***100.0***	0	2	0	0	***69.5***	***0***
132	232	214	69	0	0	0	93	***93***	***57.4***	232	0	0	0	***0.4***	***0***
133	0	0	0	0	0	0	0	***0***	***0.0***	0	0	0	0	***28.8***	***0***
134	0	0	0	0	0	0	0	***0***	***0.0***	0	0	0	0	***56.2***	***0***
135	1	1	0	0	0	0	0	***0***	***0.0***	0	0	1	0	***75.2***	***1***
136	3,515	2,966	1,015	0	0	738	1,222	***1,961***	***65.9***	2,485	1,003	27	0	***14.6***	***27***
137	2,534	2,402	2,193	0	0	274	0	***274***	***11.1***	2,503	22	8	0	***2.1***	***8***
138	8	8	4	0	0	0	0	***0***	***7.1***	8	0	0	0	***6.2***	***0***
139	6	3	6	0	0	0	0	***0***	***0.0***	0	2	3	0	***68.0***	***3***
140	544	519	311	0	0	25	133	***157***	***33.6***	503	41	0	0	***8.1***	***0***
141	413	334	388	0	0	7	0	***7***	***1.8***	399	5	9	0	***7.3***	***9***
142	91	89	91	0	0	0	0	***0***	***0.0***	91	0	0	0	***11.4***	***0***
143	1	1	0	0	0	0	0	***0***	***0.0***	1	0	0	0	***2.4***	***0***
144	3	3	0	0	0	0	3	***3***	***100.0***	0	2	0	0	***42.5***	***0***
145	166	161	166	0	0	0	0	***0***	***0.0***	137	29	0	0	***8.4***	***0***
146	305	304	0	0	0	38	76	***114***	***100.0***	258	47	0	0	***17.2***	***0***
147	102	84	56	0	42	0	0	***42***	***42.6***	53	49	0	0	***31.5***	***0***
148	373	296	284	0	0	76	0	***76***	***21.0***	349	24	0	0	***5.3***	***0***
149	10,230	8,584	1,002	0	0	364	0	***364***	***26.7***	10,226	3	0	0	***1.5***	***0***
150	3,257	3,082	2,973	0	120	23	0	***142***	***4.6***	2,680	576	0	0	***20.2***	***0***

ENGO forest polygon	ENGO area (ha)	Forest area (ha)	PI-type 0	PI-type 1	PI-type 2	PI-type 3	PI-type 4	Rep. PI-type	Rep. PI-type (%)	Cl. Bias <30%	Cl. Bias 30-70%	Cl. Bias 70-90%	Cl. Bias >90%	Cl. Bias AWM (%)	Cl. Bias >70%
151	86	73	83	0	0	1	0	***1***	***1.2***	86	0	0	0	***7.7***	***0***
152	22	22	0	0	0	6	14	***20***	***100.0***	22	0	0	0	***9.9***	***0***
153	6	6	2	0	4	0	0	***4***	***68.1***	2	4	0	0	***28.5***	***0***
154	659	659	543	0	115	0	0	***115***	***17.5***	276	383	0	0	***25.2***	***0***
155	22	17	16	0	0	0	0	***0***	***0.0***	7	15	0	0	***30.6***	***0***
156	7,937	7,608	5,366	0	2,318	168	0	***2,485***	***31.7***	7,162	648	126	0	***19.3***	***126***
157	0	0	0	0	0	0	0	***0***	***0.0***	0	0	0	0	***2.7***	***0***
158	124	124	25	0	0	94	0	***94***	***78.9***	124	0	0	0	***3.5***	***0***
159	183	177	145	0	0	6	25	***31***	***17.7***	170	13	0	0	***11.6***	***0***
160	26	26	5	0	0	0	0	***0***	***0.0***	24	2	0	0	***22.5***	***0***
161	0	0	0	0	0	0	0	***0***	***0.0***	0	0	0	0	***34.8***	***0***
162	69	65	17	0	52	0	0	***52***	***75.8***	0	26	44	0	***65.6***	***44***
163	433	376	414	0	0	0	0	***0***	***0.0***	364	60	9	0	***26.7***	***9***
164	143	137	81	0	56	0	0	***56***	***40.8***	75	67	0	0	***25.2***	***0***
165	3	3	3	0	0	0	0	***0***	***0.0***	0	3	0	0	***46.1***	***0***
166	1,094	993	571	0	103	414	0	***518***	***47.6***	979	115	0	0	***16.1***	***0***
167	73	55	8	0	0	0	0	***0***	***0.0***	73	0	0	0	***8.0***	***0***
168	7	7	0	0	0	0	0	***0***	***0.0***	3	5	0	0	***27.7***	***0***
169	497	489	491	0	0	0	0	***0***	***0.0***	471	26	0	0	***19.0***	***0***
170	59	58	59	0	0	0	0	***0***	***0.0***	11	47	0	0	***36.4***	***0***
171	261	139	86	0	0	0	0	***0***	***0.0***	261	0	0	0	***3.3***	***0***
172	3	3	3	0	0	0	0	***0***	***0.0***	0	3	0	0	***52.3***	***0***
173	860	851	606	0	0	160	0	***160***	***20.9***	31	827	2	0	***37.0***	***2***
174	385	349	270	0	82	0	0	***82***	***23.4***	49	337	0	0	***34.3***	***0***
175	70	67	35	0	33	0	0	***33***	***48.1***	15	55	0	0	***31.4***	***0***

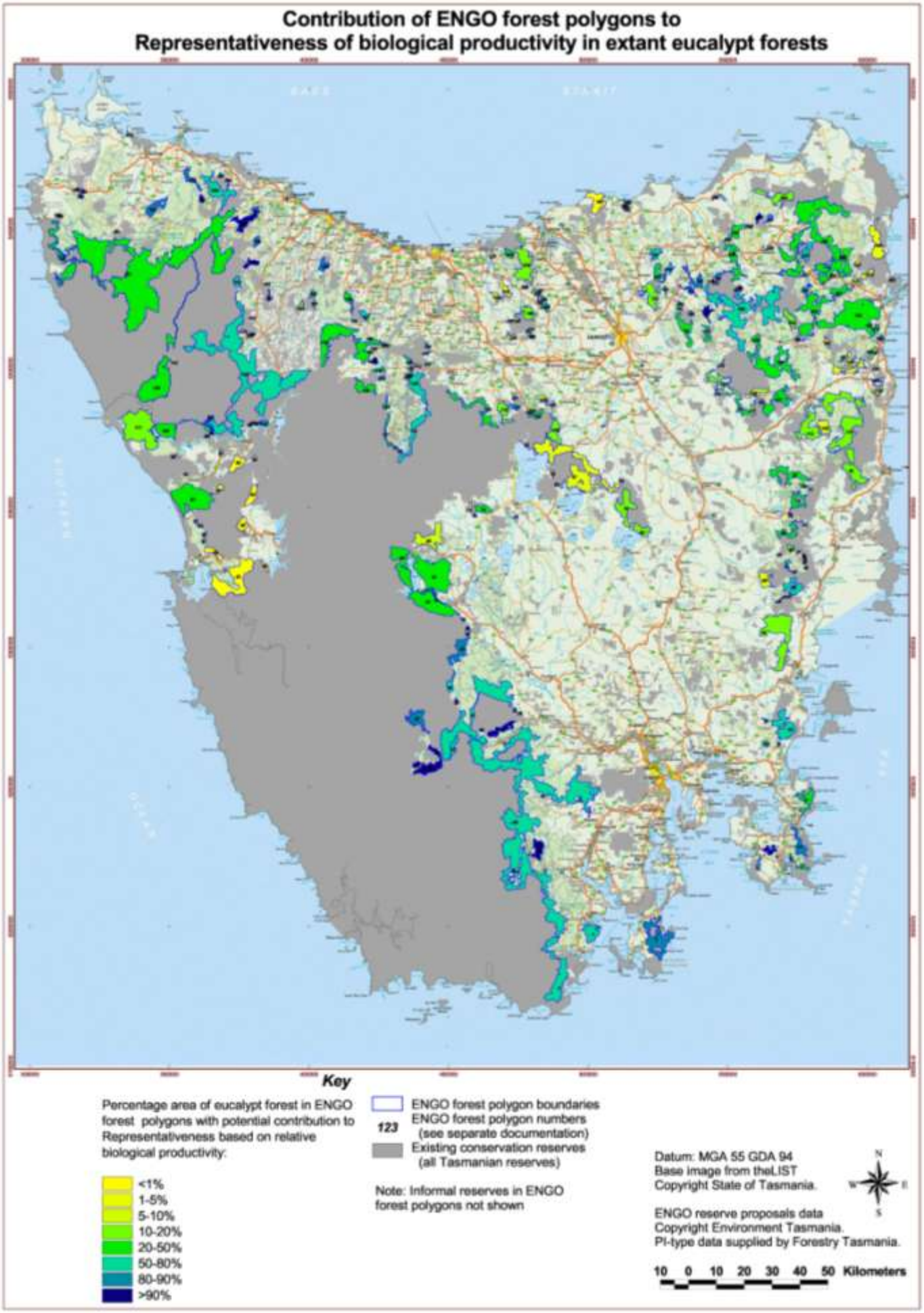
ENGO forest polygon	ENGO area (ha)	Forest area (ha)	PI-type 0	PI-type 1	PI-type 2	PI-type 3	PI-type 4	Rep. PI-type	Rep. PI-type (%)	Cl. Bias <30%	Cl. Bias 30-70%	Cl. Bias 70-90%	Cl. Bias >90%	Cl. Bias AWM (%)	Cl. Bias >70%
176	10,593	8,312	2,836	0	0	394	1,427	***1,821***	***39.1***	9,718	875	0	0	***7.2***	***0***
177	75	75	75	0	0	0	0	***0***	***0.0***	3	71	0	0	***44.9***	***0***
178	66	66	43	0	0	1	10	***11***	***20.2***	30	35	0	0	***26.5***	***0***
179	24	24	0	0	0	0	3	***3***	***100.0***	7	17	0	0	***26.5***	***0***
180	302	288	302	0	0	0	0	***0***	***0.0***	85	216	0	0	***29.6***	***0***
181	2,537	2,296	1,565	0	0	661	0	***661***	***29.7***	2,537	0	0	0	***3.1***	***0***
182	176	161	72	0	0	96	0	***96***	***57.2***	160	15	0	0	***11.1***	***0***
183	647	587	266	0	0	272	0	***272***	***50.6***	615	26	7	0	***12.0***	***7***
184	1,567	1,498	1,297	0	69	123	0	***193***	***12.9***	1,516	33	18	0	***10.8***	***18***
185	27	25	27	0	0	0	0	***0***	***0.0***	22	5	0	0	***32.4***	***0***
186	1,879	1,782	1,532	0	27	226	0	***253***	***14.2***	1,120	759	0	0	***26.6***	***0***
187	946	924	18	0	0	881	0	***881***	***98.0***	530	407	9	0	***23.2***	***9***
188	597	540	416	0	90	68	0	***158***	***27.5***	331	146	120	0	***34.3***	***120***
189	193	72	68	0	0	8	0	***8***	***10.3***	95	96	2	0	***39.9***	***2***
190	3	3	3	0	0	0	0	***0***	***0.0***	3	0	0	0	***14.1***	***0***
191	416	275	277	0	0	60	0	***60***	***17.7***	416	0	0	0	***4.7***	***0***
192	227	144	74	0	0	12	0	***12***	***14.4***	220	6	0	0	***7.5***	***0***
193	14,280	13,822	10,755	0	2,667	571	0	***3,238***	***23.1***	8,074	6,198	9	0	***28.9***	***9***
194	191	191	149	0	0	42	0	***42***	***21.8***	161	29	0	0	***17.1***	***0***
195	614	458	542	0	0	0	0	***0***	***0.0***	142	446	26	0	***46.8***	***26***
196	1,046	1,037	587	0	0	320	0	***320***	***35.3***	877	137	31	0	***12.6***	***32***
197	6,288	5,665	3,803	0	159	1,129	0	***1,287***	***25.3***	3,741	2,469	78	0	***24.5***	***78***
198	37,239	31,782	3,259	0	0	175	8,492	***8,667***	***72.7***	32,854	4,385	0	0	***6.8***	***0***
199	405	331	190	0	0	58	0	***58***	***23.4***	404	2	0	0	***6.3***	***0***
200	198	187	0	0	0	66	0	***66***	***100.0***	140	59	0	0	***17.6***	***0***

ENGO forest polygon	ENGO area (ha)	Forest area (ha)	PI-type 0	PI-type 1	PI-type 2	PI-type 3	PI-type 4	Rep. PI-type	Rep. PI-type (%)	Cl. Bias <30%	Cl. Bias 30-70%	Cl. Bias 70-90%	Cl. Bias >90%	Cl. Bias AWM (%)	Cl. Bias >70%
201	43	26	36	0	0	0	0	***0***	***0.0***	35	9	0	0	***24.5***	***0***
202	51	49	0	0	0	47	0	***47***	***100.0***	43	8	0	0	***17.8***	***0***
203	303	296	241	0	0	54	0	***54***	***18.2***	300	4	0	0	***8.9***	***0***
204	144	142	97	0	0	38	0	***38***	***28.3***	84	58	2	0	***36.7***	***2***
205	143	128	0	0	0	129	0	***129***	***100.0***	121	22	0	0	***23.9***	***0***
206	17	11	10	0	0	1	0	***1***	***12.0***	1	16	0	0	***59.4***	***0***
207	1,769	1,608	1,307	0	0	394	0	***394***	***23.2***	1,596	173	0	0	***24.7***	***0***
208	16,895	14,807	6,582	0	0	6,634	0	***6,634***	***50.2***	12,494	4,313	86	0	***18.0***	***86***
209	469	376	150	0	0	159	0	***159***	***51.5***	338	129	2	0	***24.8***	***2***
210	17	17	0	0	0	0	0	***0***	***100.0***	17	0	0	0	***17.6***	***0***
211	572	543	42	0	0	273	0	***273***	***86.8***	421	135	18	0	***33.3***	***18***
212	3,162	3,025	2,546	0	0	414	0	***414***	***14.0***	3,086	72	4	0	***8.6***	***4***
213	38	33	0	0	0	31	0	***31***	***100.0***	32	6	0	0	***16.9***	***0***
214	5	5	5	0	0	0	0	***0***	***0.0***	5	0	0	0	***13.4***	***0***
215	40	38	38	0	0	0	0	***0***	***0.0***	40	0	0	0	***13.6***	***0***
216	46	36	0	0	0	37	0	***37***	***100.0***	35	11	0	0	***25.6***	***0***
217	611	569	553	0	0	15	0	***15***	***2.6***	492	119	0	0	***25.9***	***0***
218	1,178	1,113	1,158	0	0	0	0	***0***	***0.0***	409	738	31	0	***41.1***	***31***
219	715	711	62	0	0	207	0	***207***	***77.0***	663	53	0	0	***5.4***	***0***
220	21	21	3	0	0	15	0	***15***	***82.7***	21	0	0	0	***22.4***	***0***
221	359	323	45	0	0	282	0	***282***	***86.2***	286	73	0	0	***25.7***	***0***
222	32	30	0	0	0	8	0	***8***	***100.0***	32	0	0	0	***19.5***	***0***
223	960	769	770	0	0	0	0	***0***	***0.0***	643	317	0	0	***29.2***	***0***
224	1,376	1,273	112	0	0	982	0	***982***	***89.8***	770	600	6	0	***26.9***	***6***
225	1,343	1,165	937	0	0	311	0	***311***	***24.9***	438	906	0	0	***32.6***	***0***

ENGO forest polygon	ENGO area (ha)	Forest area (ha)	PI-type 0	PI-type 1	PI-type 2	PI-type 3	PI-type 4	Rep. PI-type	Rep. PI-type (%)	Cl. Bias <30%	Cl. Bias 30-70%	Cl. Bias 70-90%	Cl. Bias >90%	Cl. Bias AWM (%)	Cl. Bias >70%
226	453	438	158	0	22	229	0	***251***	***61.4***	14	438	2	0	***37.7***	***2***
227	866	862	0	0	0	206	0	***206***	***100.0***	652	215	0	0	***14.0***	***0***
228	2	2	1	0	0	0	0	***0***	***0.0***	2	0	0	0	***24.9***	***0***
229	980	956	91	0	0	767	0	***767***	***89.4***	469	498	13	0	***39.9***	***13***
230	1	1	1	0	0	0	0	***0***	***0.0***	1	0	0	0	***23.7***	***0***
231	574	397	408	0	0	0	0	***0***	***0.0***	356	218	0	0	***33.2***	***0***
232	329	295	309	0	0	0	0	***0***	***0.0***	30	298	0	0	***42.7***	***0***
233	1,011	972	478	0	497	0	0	***497***	***51.0***	52	960	0	0	***35.5***	***0***
234	726	703	404	0	314	0	0	***314***	***43.7***	717	9	0	0	***7.1***	***0***
235	227	202	203	0	0	13	0	***13***	***6.0***	205	17	5	0	***27.1***	***5***
236	3,191	2,648	1,708	0	17	614	0	***631***	***27.0***	2,208	922	63	0	***26.2***	***63***
237	1,470	1,416	269	0	0	732	0	***732***	***73.1***	774	680	17	0	***31.1***	***17***
238	522	519	74	0	0	348	0	***348***	***82.5***	482	25	14	0	***16.3***	***14***
239	5,929	5,801	5,074	0	463	345	0	***808***	***13.7***	5,831	43	57	0	***8.4***	***57***
240	269	242	194	0	44	0	0	***44***	***18.5***	253	16	0	0	***19.1***	***0***
241	45	45	0	0	0	34	0	***34***	***100.0***	40	5	0	0	***14.5***	***0***
242	92	89	0	0	89	0	0	***89***	***100.0***	3	89	0	0	***37.0***	***0***
243	1,389	1,106	860	0	334	7	0	***341***	***28.4***	1,242	140	7	0	***22.5***	***7***
244	5,179	4,097	2,294	0	0	1,516	0	***1,516***	***39.8***	5,126	52	0	0	***8.4***	***0***
245	3,943	3,871	3,669	0	193	0	0	***193***	***5.0***	3,754	189	0	0	***16.2***	***0***
246	14	10	0	0	0	9	0	***9***	***100.0***	13	0	0	0	***6.7***	***0***
247	270	232	34	0	191	3	0	***194***	***85.0***	81	187	3	0	***37.6***	***3***
248	2	1	0	0	0	0	0	***0***	***100.0***	2	0	0	0	***3.5***	***0***
249	2,360	2,283	140	0	0	1,724	0	***1,724***	***92.5***	2,268	65	3	24	***12.0***	***27***
250	416	388	39	0	374	0	0	***374***	***90.6***	216	200	0	0	***22.5***	***0***

ENGO forest polygon	ENGO area (ha)	Forest area (ha)	PI-type 0	PI-type 1	PI-type 2	PI-type 3	PI-type 4	Rep. PI-type	Rep. PI-type (%)	Cl. Bias <30%	Cl. Bias 30-70%	Cl. Bias 70-90%	Cl. Bias >90%	Cl. Bias AWM (%)	Cl. Bias >70%
251	3	3	3	0	0	0	0	***0***	***0.0***	1	2	0	0	***55.9***	***0***
252	60,250	46,819	18,189	0	0	15,130	2,343	***17,473***	***49.0***	57,141	2,949	158	4	***4.7***	***162***
253	2	2	0	0	0	0	0	***0***	***0.0***	0	2	0	0	***67.9***	***0***
254	289	287	28	0	0	197	0	***197***	***87.6***	289	0	0	0	***11.2***	***0***
255	40	24	26	0	0	0	0	***0***	***0.0***	0	29	10	0	***0.0***	***10***
256	162	80	83	0	0	0	0	***0***	***0.0***	8	152	0	0	***0.0***	***0***
257	1,958	1,857	264	0	0	1,239	0	***1,239***	***82.4***	1,946	4	4	5	***2.6***	***9***
258	25,482	21,049	11,441	0	242	6,710	0	***6,952***	***37.8***	21,588	3,894	3	0	***23.5***	***3***
259	276	258	0	0	0	245	0	***245***	***100.0***	276	0	0	0	***7.1***	***0***
260	371	281	13	0	0	0	0	***0***	***0.0***	2	356	13	0	***57.6***	***13***
261	132	132	2	0	0	54	0	***54***	***96.8***	17	115	0	0	***39.7***	***0***
262	2,961	1,527	1,682	0	0	0	0	***0***	***0.0***	193	2,631	0	0	***0.0***	***0***
263	92	91	0	0	0	89	0	***89***	***100.0***	31	61	0	0	***28.7***	***0***
264	2,975	2,462	2,219	0	270	0	0	***270***	***10.9***	2,973	2	0	0	***15.7***	***0***
265	86	86	0	0	0	13	0	***13***	***100.0***	7	79	0	0	***32.9***	***0***
266	36	35	13	0	0	22	0	***22***	***62.6***	25	11	0	1	***28.4***	***1***
267	140	103	79	0	0	60	0	***60***	***43.3***	59	80	0	0	***39.8***	***0***
268	4,576	2,832	2,073	0	0	2,088	0	***2,088***	***50.2***	4,170	125	248	33	***11.8***	***281***
269	1,097	1,050	116	0	0	846	0	***846***	***88.0***	998	49	26	22	***13.4***	***48***
270	227	122	0	0	0	0	0	***0***	***0.0***	29	194	0	0	***0.0***	***0***

Attachment 3. Map of percent of ENGO forest polygons meeting productivity threshold



Attachment 4. Map of limitation on Representativeness from past land clearing