Calculating the sustainable yield of Tasmania's State forests

S.B. Whiteley*
Forestry Tasmania

Abstract

Forestry Tasmania manages 1.6 million hectares of State forest, about half of which is available for wood production. This paper describes the procedure for resource estimation and review used to calculate the sustainable yield of Tasmania's State forests. The concept of sustainable yield is defined and described. The major components involved in resource estimation (areas of forest, yields of wood, operational factors, cutting strategies and growth information) are discussed.

The area information and systems used to determine the estimated net forest area available for harvesting include the use of photo-interpreted forest types, the Management Decision Classification zoning system and provisional coupes. The procedure for estimating wood yield per hectare uses historical harvest records, forest inventory and growth estimates. Information is stored and processed by a computer-based model, the Forest Inventory Projection System. Cutting strategies are developed to meet specified forest management principles and legislated requirements. The level of sustainable yield is calculated by modelling forest harvesting and growth over time. Yields can be sustained in perpetuity by allowing a cut of no more than the incremental growth. Feedback and review is an integral part of the procedure for calculating the sustainable yield. The actual area harvested and products sold by coupe are monitored. Resource estimates are revised each five years to reflect measured productivity improvements through more intensive forest management, changes in the forest inventory, and improved utilisation of products.

* e-mail: steve.whiteley@forestrytas.com.au

Introduction

The Tasmanian Regional Forest Agreement (RFA) included a commitment by Tasmania to prepare a description of the methods of calculating sustainable yield on public land, including special species timber sawlogs (Commonwealth of Australia and State of Tasmania 1997). This paper describes the procedure for resource estimation and review on State forest currently used by Forestry Tasmania. It can be applied to determine the sustainable yield of high quality eucalypt sawlogs and veneer logs, and special species timber sawlogs.

The concept of sustainable yield forms a part of, but should not be confused with, the over-arching goal of sustainable forest management (SFM). SFM is concerned with whether forests are being sustainably managed for their full range of benefits—environmental, economic and social—for current and future generations, providing a balanced return from all forest uses. Through the RFA, Tasmania is committed to SFM of all its forests. Forestry Tasmania is explicitly committed to this goal on State forest.

The concept of sustainable yield is based on several assumptions.

- Forests must be protected, particularly from fire, and regenerated after harvest.
- A forest must be growing. This means replacing mature and over-mature forests, which show no net growth, with actively growing forests.
- Demand for wood will vary with changing markets and technologies. The aim is to supply wood markets without compromising the ability of the forest to continue to supply them in the future (Resource Assessment Commission 1992).

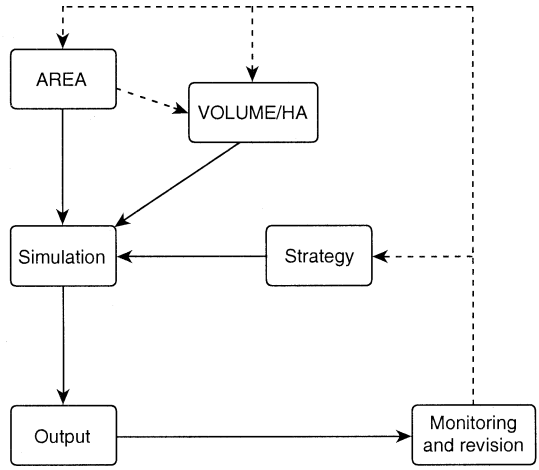

Figure 1. Procedure for resource estimation and review.

For wood products, the sustainable yield of a forest is the maximum level of commercial timber (or product mix) that can be maintained under a given management regime (Forestry Commission 1994a). For any forest area, there is no single measure of sustainable yield. The sustainable yields of timber products are determined not only by the nature of the resource but also by the objectives and constraints that make up a management strategy (Ritman *et al.* 1997). The level of commercial timber yield is dependent on the rotation length and standards of utilisation. Rotation length is governed by the desired mix of forest products, which in turn is influenced by the standards of utilisation (the size and quality criteria that are used to define forest products) and how well the utilisation standards are enforced. Forest product specifications also change over time as new industries and markets emerge. The yield of commercial timber will vary accordingly (Tasmanian Woodchip Study Group 1985).

A glossary of terms is included at the end of the paper.

Framework

Resource estimation is a process involving areas of forest, yields of wood, operational factors, cutting strategies and growth information leading to an estimated level of sustainable harvest of defined products. Forestry Tasmania's resource estimates are continually monitored and periodically revised. Feedback is provided by a process of analysis of coupe yields both in terms of utilisation standards (recovered volume per hectare logged) and comparison of planned and actual areas logged. This process has been formalised in five-yearly reviews of sustainable yield provided for in the Tasmanian Forests and Forest Industry Strategy (FFIS) and RFA. This iterative process allows timely adjustments based on up-to-date information as circumstances change.

The major components involved in the calculation of sustainable yield are shown in Figure 1. Each step is briefly described below.

Forest area

The allocation of forest for wood production begins with land tenure allocation at the State level. In Tasmania, a Register of Multiple Use Forest Land has been created by Parliament. Public forests on this register are required to be managed for sustainable multiple use and are potentially available for wood production. Forestry Tasmania also manages Forest Reserves, which have been allocated for protection and are managed for conservation or recreational purposes. Forestry Tasmania manages 1.6 million hectares of State forest, about half of which is available for wood production.

Area information that is relevant to yield estimation includes vegetation types, topographic features, cadastral boundaries and forest planning decisions that determine net harvestable areas. The key area datasets are stored and processed digitally in a geographic information system.

State forests are aerially photographed at regular intervals. The aerial photographs are interpreted for such features as forest type (eucalypt forest, rainforest, non-forest) and then, for the forested lands, for such features as present and potential total tree height,

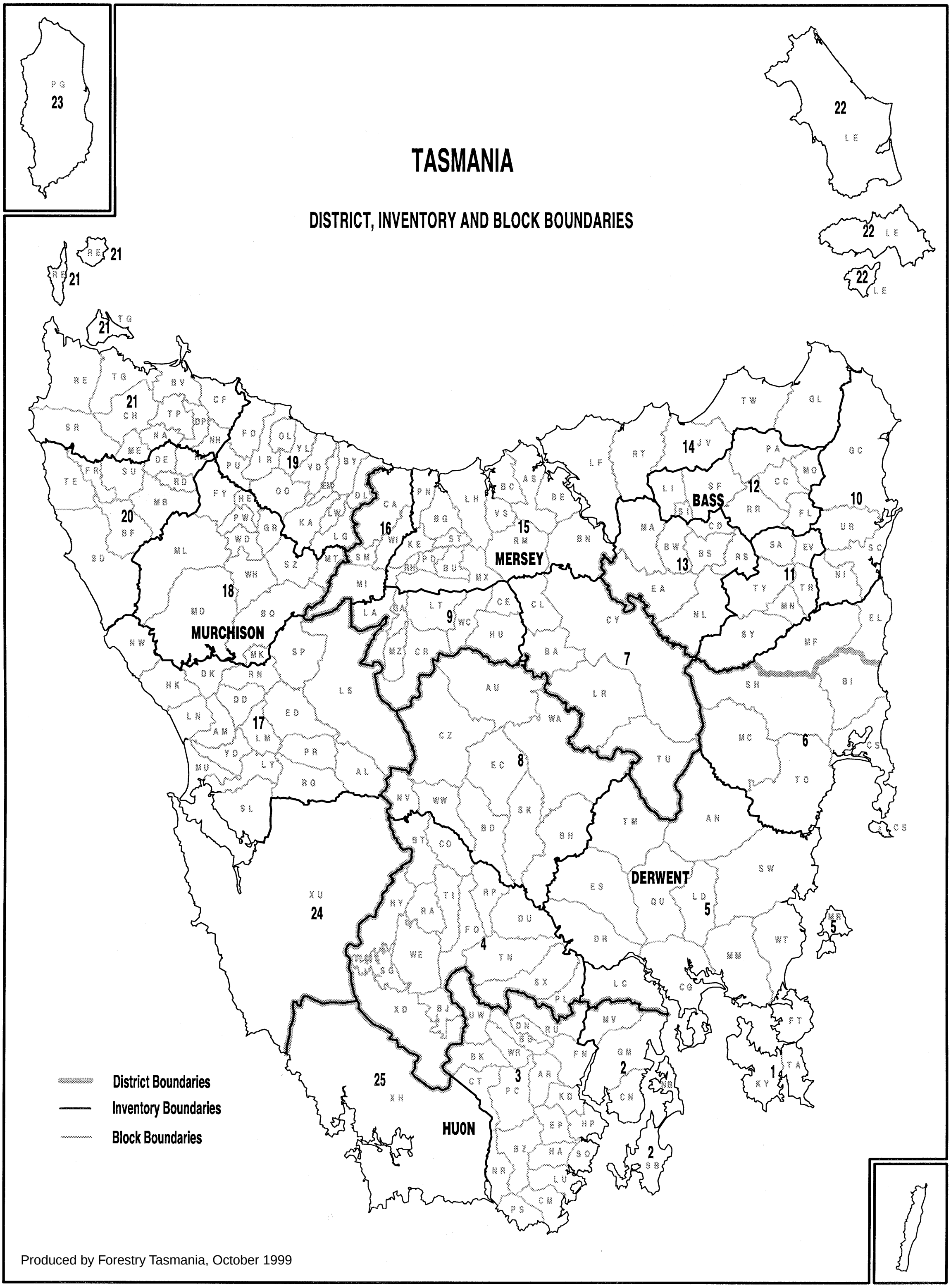

Figure 2. Forest District, Inventory Area and Forest Block boundaries in Tasmania.

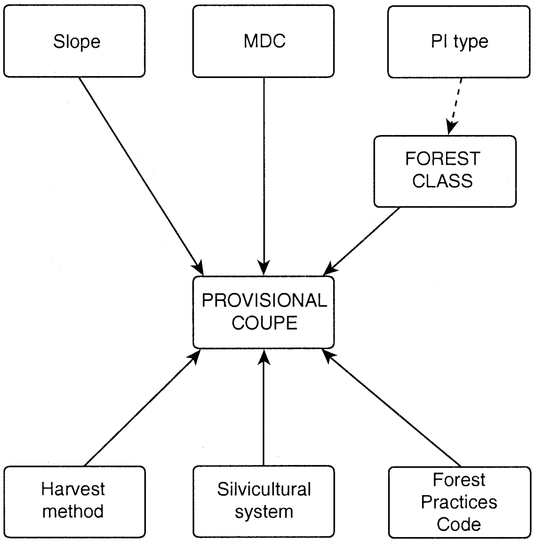

Figure 3. Procedure for estimating the net area of forest.

associated species groups and tree crown density (Stone 1998). These photo-interpreted (PI) details are stored on a Geographic Information System (GIS). The large number of possible PI patches are grouped into forest classes, based generally on their common height potential and present standing crop condition (van Saane and Gordon 1987). The forest classes currently used by Forestry Tasmania are listed in Appendix 1.

For administrative purposes on State forest, the State is divided into Forest Blocks. Blocks (about 10 000 ha) are further subdivided into compartments (about 200 ha). Groups of Blocks containing similar forest types are aggregated into Inventory Areas (21). Groups of Inventory Areas are further aggregated into Forest Districts (5). Figure 2 shows the current Forest Blocks, Inventory Areas and Forest Districts.

The gross forest area is not the forest area available for harvesting. To obtain an estimate of the area available for harvesting, the area of forest that has priority for other uses or is inaccessible or otherwise unavailable must be discounted from the gross forest area. The approach used by Forestry Tasmania is to systematically partition the forest at a resolution equivalent to the scale at which harvesting operations are planned. The scale currently used is 1:25 000.

Forestry Tasmania uses a map-based zoning system, the Management Decision Classification (MDC), to delineate forest to be managed for uses other than wood production from forest to be managed for wood production (Orr and Gerrand 1998). The MDC system is two-tiered. On a primary level, forests are categorised into zones as Production, Conditional (forest where problems associated with harvesting or regeneration require further research) or Protection. The Protection Zone includes the RFA Informal Reserves that form a part of the CAR Reserve System. As such, the sustainable yield for the public forest estate will continue to be based on areas available for timber harvesting outside the CAR Reserve System. On the second level, special management zones (SMZ) may be created to manage for the conservation of special values. Nineteen different special management zones are currently defined: apiary, intensive silviculture, long rotation, special timbers production, plantation, harvest deferred, utility, fuel management, landscape, recreation and education, water supply, forest health, geomorphic hazard, cultural heritage, geoconservation feature, flora, fauna, research, and agricultural activity. All SMZs that are considered incompatible with wood production are included in the Protection Zone and are not available for wood production. Some SMZs in the Production Zone may lead to reduced wood yield or restrict the timing of operations. Special Timbers Management Units (STMU), located mainly in the north-west and south, are managed over a long rotation (200 years) specifically for the sustainable production of special species timbers.

The basic operational unit for timber harvesting is a coupe. The definition of a coupe boundary is generally driven by a logging operation. A coupe will normally be within one compartment from which its name is derived. For example, AR021C is Arve block, compartment 021, operational area C.

All forest in the Production and Conditional Zones has been mapped into provisional coupes: that is, as if they were to be harvested in the near future. District-based planners who prepare operational plans carry out the 'couping-up'. The elements that are considered when delineating a provisional coupe are shown in Figure 3. Through the process of couping-up, the area of forest that is important for commercial wood production is estimated.

Under the Forest Practices Code (Forestry Commission 1993), forest is required to be retained uncut to conserve defined flora, fauna and landscape values, protect archaeological and geomorphological sites and to protect soil and water values.

Silvicultural guidelines, published by Forestry Tasmania in a series of bulletins (e.g. Forestry Tasmania 1994b, 1998a, 1998b), provide the basis for separating operational boundaries, due to the characteristics of the forest, into operation types. The primary division is between clearfall harvesting and a range of partial-logging techniques.

Harvest method is decided by reference to the topography and forest type. Areas which are likely to require harvesting by cable-logging equipment are distinguished from those where ground-based systems may be used.

Although the delineation of provisional coupes has taken account of most of the likely discounts in wood production areas, the area will often be further reduced as a result of intensive field inspections prior to, and during, forest operations. These may reveal rocky or other inaccessible areas, and areas likely to be subsequently zoned as SMZ such as habitats of rare and endangered species or archaeological sites. A discount factor is applied, based on recent operational experience, to make allowance for these reductions. Discounts are reviewed five-yearly.

Inventory and growth

Forest inventory and growth estimates are made for the available forest area. Estimates of the volume of wood available per hectare of forest are made using historical harvest records, continuous inventory plots, or temporary plots. Inventory data supply volume estimates at the time of plot measurement. Trees can be 'grown on' to some future date, by applying a growth model. Areas harvested in the past have been analysed to compare assessed volumes with actual recovered volumes. This comparison is used to calibrate the volume estimates where possible. The volumes used for the calculation of sustainable yield are based on current harvesting practices and utilisation standards. An overview of the elements which make up the procedure for estimating wood yield per hectare are shown in Figure 4.

A Continuous Forest Inventory (CFI) system provides estimates of the standing condition of the 'growing' forest at the time of inventory. The CFI system samples at a predetermined rate (two permanent plots per 500 ha), and plots are remeasured at

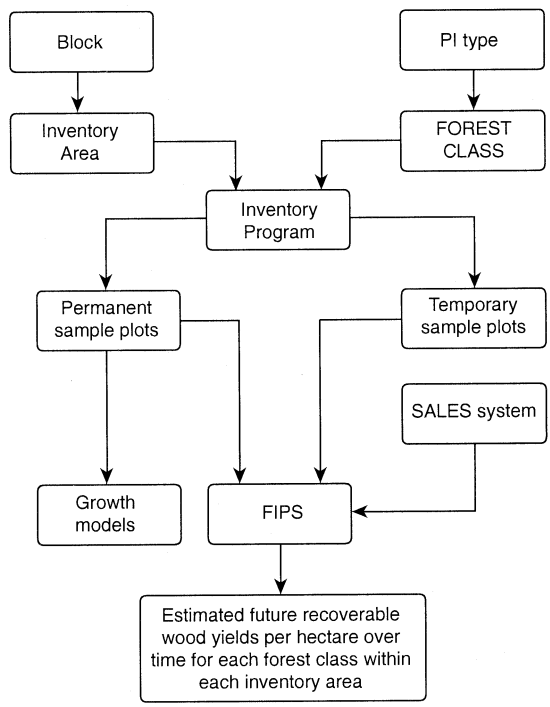

Figure 4. Procedure for estimating wood yield per hectare.

10-yearly intervals, with all commercial tree species measured. Permanent plots are used to measure the change in stands over time and thus they provide some of the basic data for Forestry Tasmania's growth models. Temporary CFI plots, or mature forest plots, are established in strata of mature forest for much of the State. Estimates of plot volume are used to determine the volume per forest stratum. Each type of inventory applied over a defined inventory area is called a 'program'. The estimates from each program are determined independently but may be combined when the program does not cover the entire Inventory Area (Turner *et al.* 1996).

Inventory data for native forests are stored and processed by a computer-based model, the Forest Inventory Projection System (FIPS). FIPS allows the sample information to be aggregated and used to estimate the population parameters of a designated forest stratum. Sample plots from the various inventory programs can be selected and aggregated by strata and sub-strata to provide estimates of the stand structure and volumes. Growth is estimated for each forest class using yield functions based upon stand volume and site index (or productive potential of an area of forest). The volume estimates for each forest class are adjusted for what has actually been harvested in recent logging of those forests. These records are retrieved from the SALES system.

The process results in strategic-level estimates of the recoverable volumes of sawlog and pulpwood per hectare for each forest class, within each inventory area, over time.

Cutting strategy

The notion of sustainable yield relies on the identification of what is to be sustained. The Tasmanian Forests and Forest Industry Strategy (FFIS) sets out detailed forest management principles and recommendations for forest use (Forests and Forest Industry Council 1990). State forests are managed to produce a sustainable supply of timber products within a framework of multiple use. The strategy recommends that a minimum of 300 000 m^3 of high quality hardwood sawlogs (and veneer logs) will be made available annually from public forests. This level is legislated in the Forestry Act as the minimum volume of crown hardwood sawlog that has to be made available each year from State forest. Similarly, target annual supply levels for special species sawlogs are recommended. The aim is to provide a continuing level of supply of species such as blackwood (10 000 m^3), myrtle and sassafras (5000 m^3), silver wattle (3000 m^3) and Huon pine (500 m^3). There is no set harvest level for pulpwood. The pulpwood supply level is a function of the harvesting strategies adopted to achieve a supply of sawlogs.

The level of supply depends on management intensity. Yields can be sustained in perpetuity by allowing a cut of no more than the incremental growth. In the case of sawlog production from publicly owned forests, this means the adoption of an average 90-year rotation for extensively managed eucalypt forests in combination with intensive management strategies. Table 1 lists the average rotation length for a range of forest types and management systems.

The RFA includes new Intensive Forest Management initiatives that have been designed to provide for the FFIS sawlog targets from public land. Intensive forest management practices include regrowth thinning, to promote more rapid growth on the remaining trees, and the establishment of plantations managed to grow sawlogs.

Table 1. Average rotation length.

Forest type	Rotation (years)
Native forest	
Eucalypt (extensively managed)	90
Eucalypt (thinned regrowth)	65
Blackwood (swamp forest)	70
Myrtle (STMU)	200
Plantation	
Eucalypt	15–35
Blackwood	40

The current eucalypt strategy includes commercially thinning at least 300 ha/yr of high quality regrowth, aged 25–35 years, which enables the rotation age to be reduced to 65 years. The strategy also has the aim of establishing about 5600 ha/yr of eucalypt plantations, managed to produce sawlogs and other high-value solid wood products and fibre. It is assumed that about one third of the area planted will be on cleared land which has been leased or purchased. The plantation rotation length will vary according to site quality and regime. Current modelling assumes that plantations on the best sites will be harvested at 25 years, with average sites harvested at 20 years.

The current myrtle sawlog supply strategy includes sawlogs produced from arisings from eucalypt harvesting operations, and the sustainable yield from the STMUs. The current blackwood sawlog supply strategy includes sawlogs produced from a combination of arisings from eucalypt and STMU harvesting operations, the sustainable yield from blackwood swamps, and plantations.

Yield simulation

Yield simulation is the modelling of potential allowable cut of wood over time. It is an iterative process, based on the area and volume information, according to strategies that are formulated by applying objectives and constraints.

The areas, volumes per hectare and forest cutting strategy provide inputs to a computerised forest optimisation program, WOODSHED. The stand simulations from FIPS can be allocated to the appropriate stands (in this case, provisional coupes). There are about 13 000 provisional coupes currently identified.

The growth of the whole forest estate for a designated supply zone is simulated. The objective may be to maximise some resource or financial criterion, and will be subject to various constraints. Either a particular class of wood, or all wood, can be optimised and, if values are given, then gross revenue can be optimised.

The level of supply for most wood products is set at the State level. Intensive forest management targets are normally set at the supply-zone level. Because of the size and complexity of the task, the simulation in the 1998 revision of the eucalypt sustainable yield was undertaken at supply-zone level (Forestry Tasmania 1998c). There are currently ten supply zones: two in each of Bass and Murchison Forest District, four in Derwent Forest District and one in each of the other two Districts.

Sustainable yield is calculated by maximising the annual volume of high quality sawlog over the scheduling period, subject to specified constraints.

For eucalypt forests, the scheduling period is normally two rotations. Constraints are normally set to ensure that the young regenerated forests are not scheduled for harvesting until they reach rotation age. The first large area of silviculturally regenerated forest dates from the mid 1960s. As such, it is constrained not to be harvested until the year 2050. Other constraints are applied to the flow of products or area harvested to achieve some constancy over time. Blackwood swamps are modelled in a similar manner.

The sustainable yield of myrtle-dominated forests in STMUs is simulated at the strategic level by allocating a relatively uniform rate of harvest by area. Stratification is applied for some factors, such as quality. For example, basalt soils are linked to deep-red wood colour. On average, the area available for harvest each year is 1/200th of the net available area. At the coupe level, allowance is made for the cyclical-selection nature of harvesting. A coupe may be scheduled to be selectively harvested several times during the period of one rotation.

While WOODSHED is designed primarily for even-aged management regimes, thinning and partial-logging regimes can be specified if they are fixed in time. For example, thinning at age 30 with final harvest at age 65 simulates the intensive management of young eucalypt forest.

The simulation is intended to be applied state-wide, at the strategic level. The primary objectives addressed are the type and amount of product. Because detailed spatial data are modelled, the simulation is also able to give some emphasis to when, where and how the harvest schedule might be carried out. WOODSHED can carry out a coupe dispersal process by iterative solutions, if a file listing the neighbourhood status of each coupe is provided. Iterative links can also be created to more detailed tactical and operational scheduling.

Monitoring and revision

The actual area harvested and products sold by coupe are continually monitored. Coupe boundaries are recorded on the GIS, together with the forest types harvested. Volumes achieved are recorded in a computerised SALES system. Volumes remaining in the forest can also be monitored. A post-harvest residue assessment may be undertaken when required. It is a strip-line sample that is designed to monitor product utilisation standards. This ensures that any difference in the expected and the sold product volumes includes residues remaining in the forest. Any losses of forest due to factors such as wildfire or disease are also recorded, so that the available volume can be modified and the affected areas included in the harvest scheduling.

As a part of each five-yearly review of sustainable yield, there is a comparison made of predicted area and volume and the actual areas logged and quantity of a range of products sold. The same approach is used for both eucalypt and special species sawlog.

Forest area available is adjusted to reflect recent operational experience. This can be done by systematically altering provisional coupe boundaries, where the adjustment can be located at the resolution of the mapping (such as a change in streamside reserves) or by the application of a within-coupe discount. The discount can be applied to a specific product; for example, if only sawlog trees are harvested from a rocky outcrop, this may result in retention of 10% of available pulpwood trees on the coupe. The discount can be applied to all products; for example, in order to prepare a safe coupe boundary for fire management, 5% of the potential area may not be harvested. In the 1998 revision of the eucalypt sustainable yield, coupe discounts in the range of 5–20% were applied.

Wood yields per hectare are adjusted based on the comparison of predicted and actual volumes. The information considered is the actual products sold and the area of each forest class that was logged for each individual coupe. For each forest class, the expected volume and product mix is predicted by inventory. For each coupe, summing the contribution of each forest class makes up the total expected volume. Over several years, a comparison can be made of expected production and actual utilisation. Any difference can be used to modify future predictions. The approach used is to attempt to individually modify each forest class in each block for each product class. In practice, in most instances, there are insufficient data to review results in this detail. In the 1998 revision of the eucalypt sustainable yield, adjustments were applied to product groups and groups of forest classes, for each inventory area.

The application of a process of feedback and review is an integral part of the procedure for calculating the sustainable yield. This iterative process allows timely adjustments based on up-to-date information as circumstances change. This is increasingly important in an era of rapidly changing technology and markets.

Conclusion

The methodology for calculation of the sustainable yield of Tasmania's State forests has evolved over many years. The basic principles and framework have now been applied in a consistent manner for at least the past decade.

Developments have occurred primarily in the use of computer-based systems. Advances in available technology, particularly GIS, databases and linear programming packages, have enabled more complex problems to be modelled more quickly. The development of planning systems, such as MDC and provisional coupes, has led to a better integration of strategic and operational resource analysis and planning. These areas are expected to continue to change to meet changing needs.

The main areas driving future development of the methodology will relate to the measurement of productivity improvements:

- In the forest, through the successful adoption of more intensive forest management regimes;
- In utilisation, through harvesting and mill recovery; and
- As new products or product specifications arise.

Acknowledgements

Figure 2 was compiled by Tony Rainbird and Luke Ellis (Forestry Tasmania).

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Glossary

Comprehensive, Adequate and Representative (CAR) Reserve System: A Formal and Informal Reserve system incorporating both public land and private land that is based on the principles of comprehensiveness, adequacy and representativeness as described by the JANIS Report. This report provides agreed national guidelines for the reservation of biodiversity, oldgrowth forest and wilderness, taking account of reserve design and management, and social and economic considerations.

Continuous Forest Inventory (CFI): A forest inventory system which provides estimates of the standing condition of the 'growing' forest at the time of inventory. CFI samples at a predetermined rate (two permanent plots per 500 ha) and plots are remeasured at 10-yearly intervals, with all commercial tree species measured.

Coupe: A discrete area of forest harvested and regenerated in a single operation (usually over one or two years).

Forest Inventory Projection System (FIPS): Native forest wood inventory processing and growth projection system.

Forest Class: A numeric code that is used to stratify eucalypt forest types into classes that have broadly similar timber volume and growth characteristics.

Geographic Information System (GIS): A computer-based tool for mapping and analysing geographic phenomenon that exist, and events that occur, on Earth.

Informal reserve: A term from the RFA (Attachment 6) for areas of State forest zoned for Protection in the Management Decision Classification system (except for the Forest Reserves) and other administrative reserves on public land managed to protect CAR values.

PI type: Coded description of forest vegetation, derived by stereoscopic interpretation from aerial photographs.

SALES (system): Manages the sales process. Invoices customer for products taken and pays contractors and other third party beneficiaries as appropriate. Keeps track of the amount of forest products taken from coupes.

Site Index: The Mean Dominant Height (MDH), in metres, of a stand at the age of 50 years, where MDH is the mean of the heights of the tallest dominant trees at the rate of one tree per 1/30th of a hectare.

Special Timbers Management Units (STMU): Selected rainforest areas within multiple-use State forest within which priority is given to the sustainable production of special species timbers.

WOODSHED: Linear-programming software. Harvest-scheduling package for plantations and native forests, used for strategic and tactical planning.

Appendix 1. Relationship between forest classes and groupings of PI types.

Forest Class	PI Type	Forest Type
1	E1a&b without regrowth	Mature Eucalypt Forest
2	E1c&d without regrowth	Mature Eucalypt Forest
3	E2a&b without regrowth	Mature Eucalypt Forest
4	E2c&d without regrowth	Mature Eucalypt Forest
5	E+3a&b without regrowth	Mature Eucalypt Forest
6	E+3c&d without regrowth	Mature Eucalypt Forest
7	E-3a&b without regrowth	Mature Eucalypt Forest
8	E-3c&d without regrowth	Mature Eucalypt Forest
9	E4a,b&c without regrowth	Mature Eucalypt Forest
10	E4d without regrowth	Mature Eucalypt Forest
11	E5a&b without regrowth	Mature Eucalypt Forest
12	E5c&d without regrowth	Mature Eucalypt Forest
13	E1a&b with unheighted regrowth	Mature with unheighted Regrowth
14	E1c&d with unheighted regrowth	Mature with unheighted Regrowth
15	E2a&b with unheighted regrowth	Mature with unheighted Regrowth
16	E2c&d with unheighted regrowth	Mature with unheighted Regrowth
17	E+3a&b with unheighted regrowth	Mature with unheighted Regrowth
18	E+3c&d with unheighted regrowth	Mature with unheighted Regrowth
19	E-3a&b with unheighted regrowth	Mature with unheighted Regrowth
20	E-3c&d with unheighted regrowth	Mature with unheighted Regrowth
21	E4a,b&c with unheighted regrowth	Mature with unheighted Regrowth
22	E4d with unheighted regrowth	Mature with unheighted Regrowth
23	E5a&b with unheighted regrowth	Mature with unheighted Regrowth
24	E5c&d with unheighted regrowth	Mature with unheighted Regrowth
25	ER4-6 + E1or2	Regrowth Eucalypt with Mature
26	ER3 + E1or2	Regrowth Eucalypt with Mature
27	ER1and2 + E1or2	Regrowth Eucalypt with Mature
28	ER3and4 + E+3	Regrowth Eucalypt with Mature
29	ER1and2 + E+3	Regrowth Eucalypt with Mature
30	ER3 + E-3	Regrowth Eucalypt with Mature
31	ER1and2 + E-3	Regrowth Eucalypt with Mature
32	ER1and2 + E4	Regrowth Eucalypt with Mature
33	ER1 + E5	Regrowth Eucalypt with Mature
34	ER4-6/1or2	Pure Regrowth Eucalypt
35	ER3/1or2	Pure Regrowth Eucalypt
36	ER1and2/1or2	Pure Regrowth Eucalypt
37	ER3and4/+3	Pure Regrowth Eucalypt
38	ER1and2/+3	Pure Regrowth Eucalypt
39	ER3/-3	Pure Regrowth Eucalypt
40	ER1and2/-3	Pure Regrowth Eucalypt
41	ER1and2/4	Pure Regrowth Eucalypt
42	ER1/5	Pure Regrowth Eucalypt
45	Up to 1959 regen /1or2	Eucalypt Regeneration (aged Regrowth)
46	Up to 1959 regen /+3 or X	Eucalypt Regeneration (aged Regrowth)
47	Up to 1959 regen /-3	Eucalypt Regeneration (aged Regrowth)
48	Up to 1959 regen /4	Eucalypt Regeneration (aged Regrowth)
49	1960s regen /1or2	Eucalypt Regeneration (aged Regrowth)
50	1960s regen/+3 or X	Eucalypt Regeneration (aged Regrowth)
51	1960s regen/-3	Eucalypt Regeneration (aged Regrowth)
52	1960s regen /4	Eucalypt Regeneration (aged Regrowth)
53	1970s regen /1or2	Eucalypt Regeneration (aged Regrowth)
54	1970s regen/+3 or X	Eucalypt Regeneration (aged Regrowth)

Forest Class	PI Type	Forest Type
55	1970s regen/-3	Eucalypt Regeneration (aged Regrowth)
56	1970s regen /4	Eucalypt Regeneration (aged Regrowth)
57	1980s regen /1or2	Eucalypt Regeneration (aged Regrowth)
58	1980s regen/+3 or X	Eucalypt Regeneration (aged Regrowth)
59	1980s regen/-3	Eucalypt Regeneration (aged Regrowth)
60	1980s regen /4	Eucalypt Regeneration (aged Regrowth)
61	1990s regen /1or2	Eucalypt Regeneration (aged Regrowth)
62	1990s regen/+3 or X	Eucalypt Regeneration (aged Regrowth)
63	1990s regen/-3	Eucalypt Regeneration (aged Regrowth)
64	1990s regen /4	Eucalypt Regeneration (aged Regrowth)
65	regen/5	Eucalypt Regeneration (aged Regrowth)
66	Unstocked/1or2	Unstocked Eucalypt Forest
67	Unstocked/+3	Unstocked Eucalypt Forest
68	Unstocked/-3	Unstocked Eucalypt Forest
69	Unstocked/4	Unstocked Eucalypt Forest
70	Unstocked/5	Unstocked Eucalypt Forest
71	Unstocked/X	Unstocked
72	M+	Rainforest
73	M-	Rainforest
74	T	Other Native Forest
75	Tw	Other Native Forest
76	Not Typed	Non-Forest
77	Non-Forest	Non-Forest
80	up to 1944 SWP on Crown land	Plantation
81	1945-49 SWP on Crown land	Plantation
82	1950-54 SWP on Crown land	Plantation
83	1955-59 SWP on Crown land	Plantation
84	1960-64 SWP on Crown land	Plantation
85	1965-69 SWP on Crown land	Plantation
86	1970-74 SWP on Crown land	Plantation
87	1975-79 SWP on Crown land	Plantation
88	1980-84 SWP on Crown land	Plantation
89	1985-89 SWP on Crown land	Plantation
90	1990-94 SWP on Crown land	Plantation
91	1995-99 SWP on Crown land	Plantation
92	Unknown yr SWP (inc private)	Plantation
93	up to 1984 HWP on Crown land	Plantation
94	1985-89 HWP on Crown land	Plantation
95	1990-94 HWP on Crown land	Plantation
96	1995-99 HWP on Crown land	Plantation
97	Unknown yr HWP (inc private)	Plantation
98	Unknown Plantation (inc private)	Plantation