

Southern Pine

OVERVIEW



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HQPlantations (HQP) is the largest plantation owner in Queensland with plantation assets totalling over 210,000 plantable hectares (ha) (520,000 acres). It's plantation assets include the extensive softwood plantations on the coastal lowlands of south-east Queensland (SEQ), extending over 116,500 hectares (ha) (287,877 acres) from just north of Brisbane to near Bundaberg. The pines planted, including the widely planted Hybrid Pine, are improved varieties derived from species native to southern USA and central America, and are collectively known as 'Southern Pines'.

LOCATION, GROWING ENVIRONMENT AND MANAGEMENT IMPLICATIONS

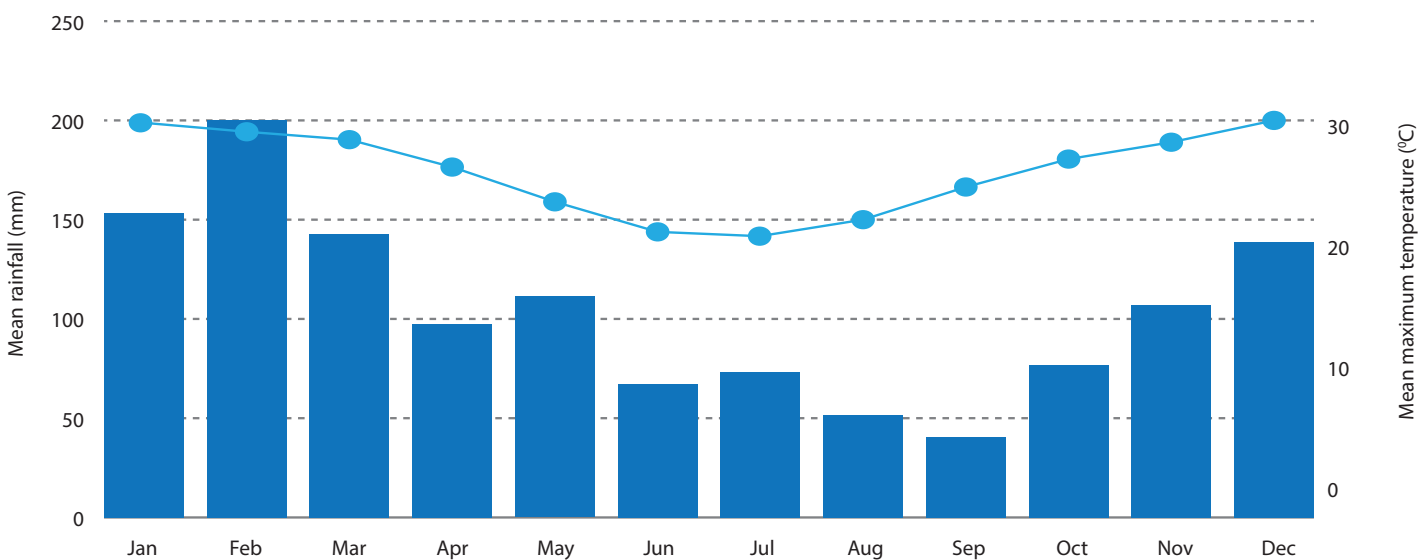
Map 1 is an overview of HQP's Southern Pine estate in SEQ in relation to the broader regional landscape including HQP's Araucaria plantations, public native forest production state forests and national parks.

The climate is humid subtropical. Rainfall generally declines from Beerburum in the south to Bundaberg in the north. Average annual rainfall at Toolara is 1,318 millimetres (mm) (52 inches), although it has ranged from under 750 mm (29 inches) to over 2,100 mm (82 inches) since 1970. The wettest period is usually between December and March.

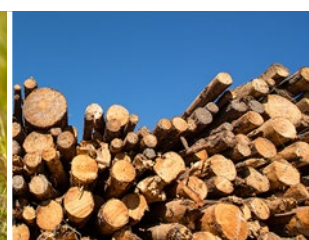
Topography is gentle to undulating, up to about 15 degrees. Much of the landscape is less than 15 metres (m) above sea level. Soils are typically derived from alluvium, undifferentiated conglomerates, sandstones, siltstones, mudstones and shales. As a result, soils are generally coarse-textured and infertile with the major nutrient limiting plantation growth being phosphorus. The main soil types are siliceous sands, lithosols, grey and gleyed podzolics, yellow earths, yellow podzolics and humus podzols.

Prolonged seasonal water logging is a common feature to many areas due to the low slopes, shallow soils and formation of a perched water table above an impervious layer of clay, laterite or hard pan at a depth between 0.5 m and 10 m and from 2 m to over 10 m thick. During above average rainfall years the groundwater levels associated with perched aquifers can remain close to the ground surface for several months. In contrast, during years of below average rainfall, groundwater may be restricted to the lower soil profile or may not be present at all.

These environmental features influence plantation growth and accessibility and need to be taken into account when planning a wide range of operations including mechanised harvesting, timing and type of site preparation, matching genetics to sites and fertiliser prescriptions.



Over half of Toolara's annual rainfall occurs between December and March



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RESOURCE, HARVESTING AND SALES

Figure 1 shows the SEQ Southern Pine estate area by 5-year age classes. As at 30 June 2014, over 21% of the estate was over 28 years old. The available wood volume and the current harvest rate of around 1.1 million (M) m³ per annum is expected to increase significantly over the next decade to around 1.8 M m³ before dropping back to around 1.6 M m³ (**Figure 2**), with a corresponding reduction in average clearfall age to around 30 years. Based on existing stands, the long term average Mean Annual Increment (MAI) is estimated to be between 15 and 16 m³/ha/yr. However, this is predicted to progressively increase as higher yielding Hybrid Pine families replace existing stands following clearfall harvest of the first rotation.

Final crop harvest volumes range from 300 – 400 m³/ha with average stem volumes typically between 0.5 and 1.2 m³. Due to generally good stem form and small branches, stems typically yield 95% sawlog and roundwood with only 5% pulpwood and residue.

Some stands are commercially thinned at around age 16 – 22 years to final crop stocking, depending on stand condition and demand for pulpwood and roundwood logs. Direct (or un-thinned) regimes are also utilised where growth and stocking rates (trees/ha) meet pre-determined management constraints.

The SEQ Southern Pine resource currently supplies around ten local customers directly, with one taking 67% of annual log harvest and the top three taking 87%. Similarly, harvest capacity is concentrated among only a few contractors with two cutting around 90% of the current harvest. Delivered log sales account for 85% of log sales.

The SEQ Southern Pine plantations support a diverse local forest growing, harvesting, transport and processing sector producing value-added products including structural timber, medium density fibreboard (MDF), particle board, landscaping timbers, poles and other treated roundwood products, energy wood fibre pellets and wood chips for export. A small proportion of logs are exported unprocessed.



Most Southern Pine is processed locally to meet domestic structural timber markets

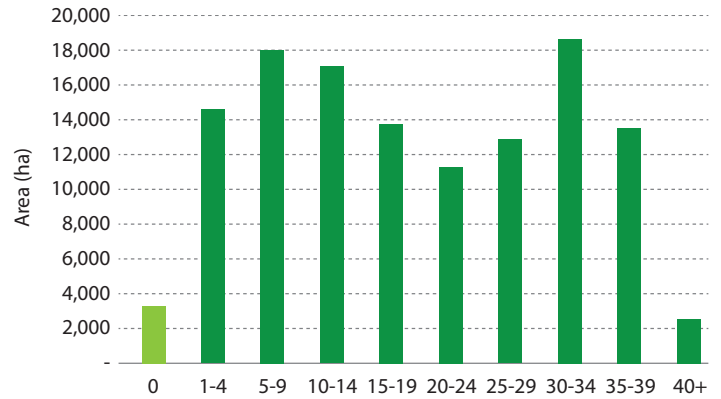


Figure 1. SEQ Southern Pine estate area (ha) by 5-year age class as at 30 June 2014

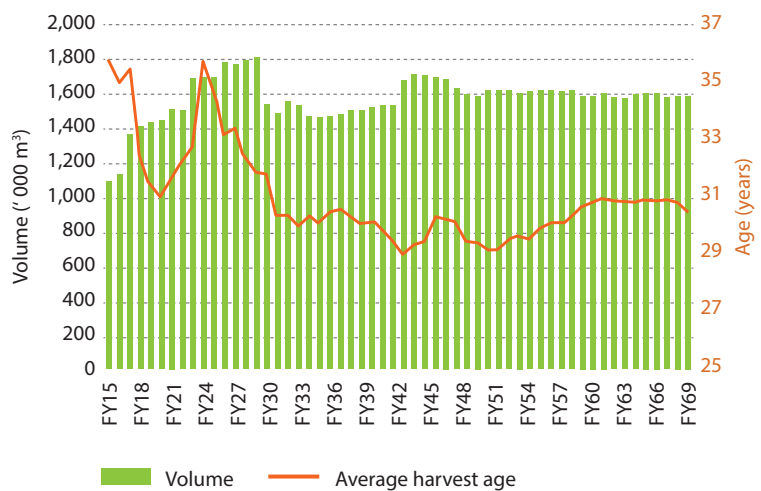


Figure 2. SEQ Southern Pine predicted harvest volume ('000 m³) and rotation age (years)



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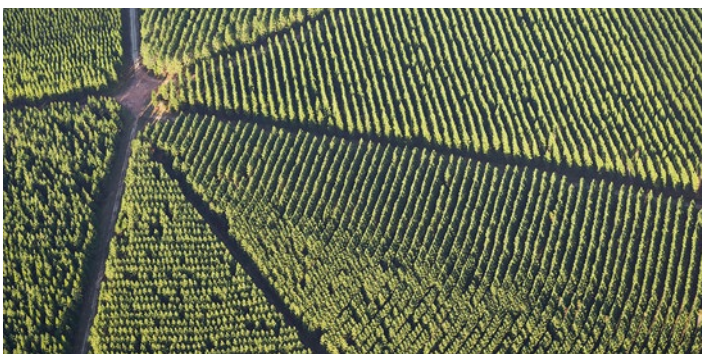
PLANTATION SPECIES, GENETIC IMPROVEMENT, SEED AND NURSERY PRODUCTION

After extensive species trials beginning in the 1920s Slash Pine (*Pinus elliottii* var. *elliottii*, PEE) was initially selected as the main species for plantation establishment in south-east Queensland. Seed was imported from Florida, USA and an extensive tree-breeding program commenced to improve tree quality. Caribbean Pine (*P. caribaea* var. *hondurensis*, PCH) was later found to be faster growing than Slash Pine (no dormant winter stage), and more suitable for tropical central and north Queensland. This led to extension of the tree breeding program to this species and its deployment on well-drained sites in SEQ, as well as in north and central Queensland. Plantations commenced at Beerburum in 1924, at Tuan in 1948 and at Toolara in 1950, mainly on previously forested country that was deemed too poor for either agriculture or commercial native forest timber production. Additional ex-grazing lands were added to the estate in the late 1970s and early 1980s as part of broader government land use allocation decisions associated with national park extensions.

To retain the desirable qualities of each species, for example the fast growth and fine branching of Caribbean Pine and the wet tolerance and improved wind-firmness of Slash Pine, PEE x PCH hybrids were produced. Planting of Hybrid Pines commenced in the mid to late 1980s, initially as seedlings then as cuttings from selected families and (later) clones. Including Byfield in central Queensland, nearly 28,000 ha of Hybrid Pine clonal plantings were established, mainly between 2002 and 2007.

Today, containerised Hybrid Pine seedlings are planted across Southern Pine sites in SEQ. Seed is sourced from selected parents in HQP's clonal seed orchards located at Byfield and Toolara. To maximize overall estate productivity, the highest quality seedlots are planted on the most productive sites.

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Most Hybrid Pine clones were planted between 2002 and 2007

HARVEST AND RE-ESTABLISHMENT

The net productive area is reasonably stable with planting largely confined to re-establishment of areas following clearfall harvest or following other unplanned events such as wildfire or windstorm.

The annual Southern Pine planting program in SEQ is around 4,000 ha depending on harvest activity and other events.

Planning of harvesting and re-establishment are closely coordinated to maximise operational efficiency and minimise cost, given that there are seasonal constraints to harvesting, site preparation and planting. A typical harvest and re-establishment sequence is as follows:

Tactical Plan (2 – 3 year horizon): Identify the quantities, qualities and locations of harvest areas to meet predicted demand. Identify and respond to broad-scale planning issues. For example, development of an age class mosaic to avoid large contiguous areas of young plantations (that contribute to a higher fire risk profile), required road and bridge upgrades, catchment runoff and water quality, haul route approvals and staged harvesting around high conservation value forest areas.

Operations Plan – harvesting: An Operations Plan is prepared for each activity-by-contractor combination. These help to manage risks and are designed to identify, consider and respond to site-specific issues relating to:

- safety (e.g. site access management, haul route, powerlines, communications);
- environment (e.g. water course protection, endangered species);
- stakeholders (e.g. neighbours, operating hours, cultural heritage sites);
- operations (e.g. research trials or other exclusions, order of operations, wet weather operations); and
- specifications relating to the operations being performed.

Each Operations Plan is reviewed and signed off with the contractor before operations commence.

Harvesting: There is extensive use of low ground pressure machinery and integrated harvesting systems (mechanical falling, processing, forwarding, loading and hauling) to minimise site disturbance and maximize operational flexibility which in turn extends the harvesting 'window' during the wet season. Clearfall harvesting is dominated by whole-stem harvesting with roadside processing at Fraser Coast while cut-to-length processing at stump with forwarder extraction to ramps is practiced at Beerburum.

A high level of resource utilisation maximises recoverable yields and facilitates low-cost re-establishment operations, characterised by on-site retention of nutrient-rich needles and smaller branches to benefit the growth of future crops and reduce erosion risk.

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Site Preparation: Depending on site factors, especially drainage and erosion risks and planting access, harvested sites may be chopper rolled, strip-cultivated (+/- mounding) or spot mounded. Some areas are re-planted with no mechanical site preparation where soil and access conditions are favourable.

Pre-Plant Weed Control: A mix of knockdown herbicides are applied via aerial or ground-based sprayers once or sometimes twice before planting, depending on the weed spectrum.

Planting: Containerised seedlings are manually planted at 830 to 1,230 stems per hectare depending on estate location and site productivity, with higher stockings on the more productive sites.

Fertilising: On non-podzol sites that received over 80 kg/ha Phosphorous (P) during the first rotation, re-fertilising at time of second rotation planting is currently not practiced. On sites that received less than 80 kg/ha P, 25 kg/ha P is applied. Podzols and siliceous sands receive 25 kg/ha P, 50 kg/ha Potassium (K) and 7.5 kg/ha Copper (Cu). Mid-rotation fertilising is not currently practiced.

Post-plant weed control: Weed control, using a combination of chemical and mechanical techniques, may continue up to age three depending on weed spectrums. Inter-row slashing or chopper rolling to control woody weeds such as wattle and pine wildlings may be required at some sites beyond age 3.



Heli-spraying for pre-plant weed control



Whole stem harvesting operations can cut and snig 1,500 m³ per day



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PLANTATION PROTECTION

During late Spring and early Summer before the arrival of the wet season, plantations are at highest risk from wildfire. Measures to protect communities, assets and plantations from wildfire include:

- maintenance of a comprehensive road and fire break network;
- periodic prescribed burning during the winter months of plantations and adjacent native forest areas to reduce fuel loads;
- stakeholder engagement (neighbours, government agencies and Emergency Services);
- a fire weather forecasting system;
- surveillance, including the use of fire lookouts, tower-mounted cameras and aerial fire spots; and
- the ready availability of modern equipment and personnel including air attack and crews prepared for pre-determined response, including as part of an agreed inter-agency incident control system (ICS) as required depending on the scale and complexity of the incident.

Other periodic risks to plantation survival and productivity include drought, wind throw, grazing damage, pests and diseases. Sirex wasp, which spread north to Queensland in 2009 near Stanthorpe, is yet to be detected in the major coastal Southern Pine estates in SEQ. The engraving bark beetle, *Ips grandicollis* is abundant in harvesting residues in SEQ and can cause the death of trees under stress, such as following severe scorch associated with a wildfire. In some cases, damage levels require salvage operations or re-planting.



Fuel reduction burning during milder Autumn and Winter months reduces fire risk during late Spring and early Summer, the peak fire danger period

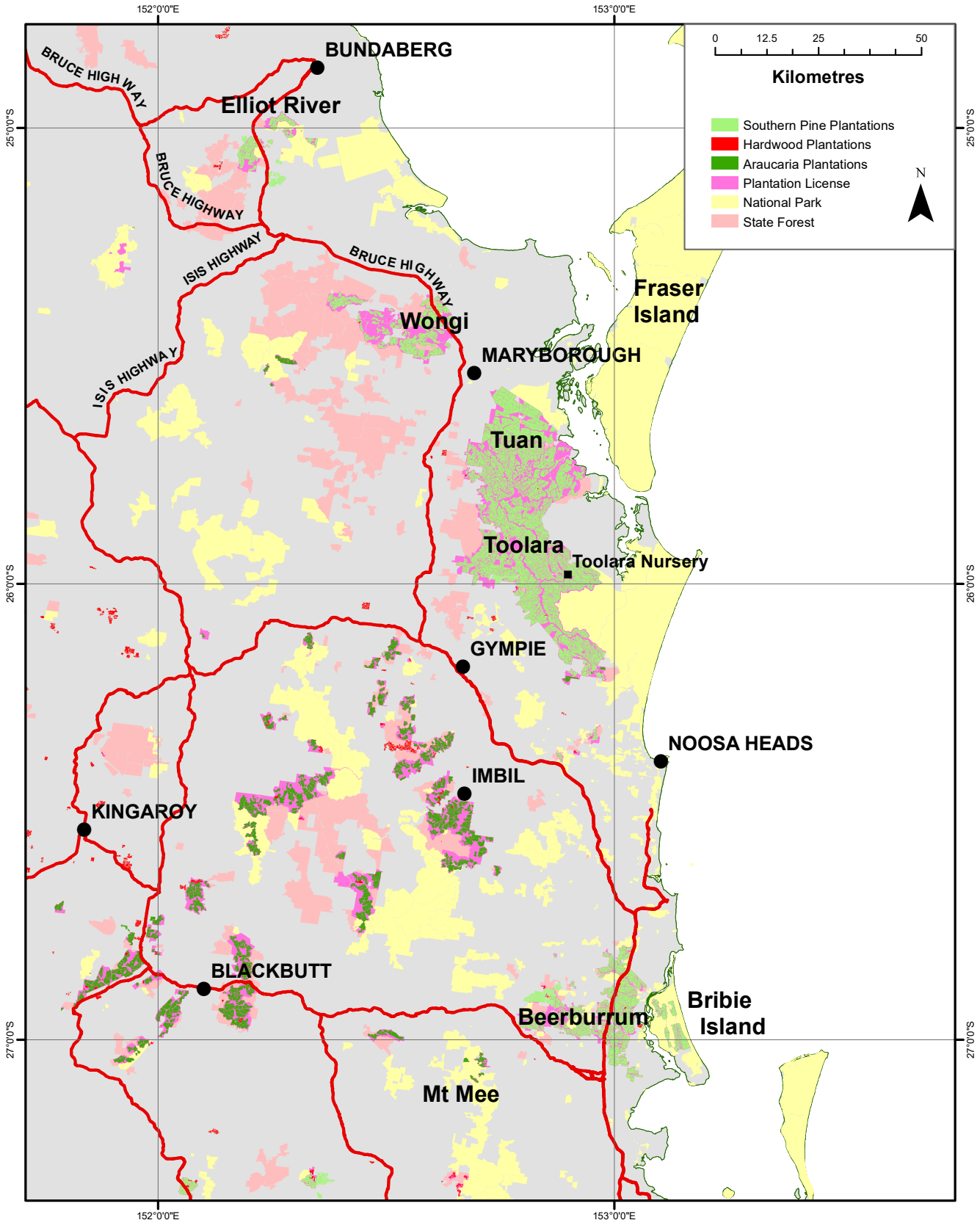


Static panel traps with specific lures are monitored during the flight season to detect the presence of new incursions such as Sirex wood wasp

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Map 1



Southern Pine OVERVIEW



STEWARDSHIP

HQPlantations is committed to sustainable forest management and its operations are independently audited on a regular basis against internationally recognised forest management standards supported by the Forest Stewardship Council® (FSC) and the Responsible Wood (RW).

FURTHER INFORMATION

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HQP is an active participant in the WaterWatch monitoring program

