

History of pine forestry in the Pelorus/Te Hoiere catchment and the Marlborough Sounds

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Extant remnant of woodlot planted in 1910s. According to Owen Couper, three woodlots of 100 trees spaced ca. 10 feet apart were planted on the Couper farm in the Rai Valley. Photo courtesy of Gemma Coutts

Abstract

The harvesting of radiata pine (*Pinus radiata*) plantations in the Pelorus/Te Hoiere catchment and the Marlborough Sounds is contributing to excessive sedimentation into coastal waters, although the timing of when this commenced is subject to debate. Here we present a history of radiata pine to document trends in forest establishment in the Pelorus/Te Hoiere catchment and the Marlborough Sounds derived from the scientific literature, newspaper articles, local histories and recollections of retired foresters. We identify that radiata pine trees were planted primarily as ornamentals, shelterbelts and woodlots from the late 1800s, with plantings increasing after the 1913 Royal Commission on Forestry.

The first commercial plantations were Farnham Forest in Queen Charlotte Sound/Tōtaranui in the 1930s and the Rai State Forest in the Pelorus/Te Hoiere catchment in 1940. Commercial plantings expanded with forestry encouragement loans from the 1960s. There are now ca. 26,420 ha of radiata pine plantations in the contributing catchments to the Marlborough Sounds. We identify that the majority of radiata

plantations are on Class 7 land in the Pelorus/Te Hoiere and Kaituna catchments, which are the largest contributing catchments to the Marlborough Sounds. These areas have soils highly susceptible to erosion, which is exacerbated by vegetation clearance. The industry has reached a point of near continuous harvest over extensive areas on steep hillsides. This means that the window of vulnerability to erosion (five to eight years after harvest) is always open somewhere across the landscape.

Introduction

Sedimentation from landslides and other forms of erosion is a natural process, to which coastal ecosystems have adapted over time. However, what has changed since human settlement in New Zealand is the accelerated rate of sedimentation caused by historical and current land uses. Excessive sediment into waterways can smother intertidal and marine benthic habitats, and thereby change ecosystem structure, composition and function by killing and displacing macrofauna and causing long-term degradative change (Thrush et al., 2004).



Rai Valley township looking east along State Highway 6, ca. early 1920s. Photo courtesy of Spittal Collection 0000.900.1572, Marlborough Museum

In Pelorus Sound/Te Hoiere, annual sediment accumulation rates have increased five to 20 times since the 1860s (Handley et al., 2017). Isotopic analysis of seabed sediments reflected historical changes in resource exploitation from indigenous forest clearance, gold mining, pastoral farming and radiata pine forestry (hereinafter 'forestry'). In recent decades, both forestry and the inflow of the Pelorus and Kaituna rivers have disproportionately contributed to sediment deposition onto the seabed compared to other sources (Handley et al., 2017).

The Marlborough Forest Industry Association (MFIA) has challenged the timing of the contribution from forestry to sediment deposition (Hemphill, 2019). The MFIA concluded the Compound-Specific Stable Isotope (CSSI) method (Gibbs, 2008) was unreliable as forestry was not extensive enough in the first half of the 20th century to generate sufficient sediment after harvest for deposition onto the seabed. Swales et al. (2020) provided a detailed rebuttal, including reference to the international acceptance of the peer-reviewed CSSI methodology.

This paper does not seek to clarify the CSSI methodology and its precision, rather the aim is to document the history of forestry in the Marlborough Sounds and contributing catchments. In a companion paper (Urlich, 2020), the environmental effects of forestry harvesting and associated earthworks on coastal ecosystems of the Marlborough Sounds were explored, along with the effectiveness of past and current regulatory regimes in mitigating adverse impacts.

Methods

We searched the National Library's Papers Past database using relevant search terms. Local histories in the Marlborough District Library's reference collection, and the Marlborough District Council's (MDC) technical report library, were examined for forestry references. We also gathered information from ex-Forest Service employees with direct knowledge of the establishment of forestry in different areas from the 1950s.

Results

Late 1800s–1920s: Woodlots and shelterbelts

Radiata pine plantings in the Marlborough Sounds date back to the second half of the 19th century. One of the first records in Marlborough was from Picton in 1891 (Handley, 2015). This was a mature flourishing tree with 'huge branches', illustrating that pine had been planted since the 1870s. Photos by the Tyree brothers during the 1890s (Nelson Museum, National Library) show ornamental mature pines in Havelock and a woodlot on slopes above the township and estuary.

Advertisements in the *Marlborough Express* in 1893, and the *Pelorus Guardian and Miners Advocate* in 1895, reflected the sale of radiata pine (formerly *Pinus insignis*). Articles and advertisements in the 1910s extolled pine's versatility, including fruit boxes, construction and shelterbelts. Planting on 'poor land' for firewood and

timber was advertised in 1920 with a density of 1,000 stems to the acre, thinned down to 100 stems per acre in the sixth year. The versatility of pine can be traced to the 1913 Royal Commission on Forestry (Hegan, 1993).

Bowie (1963) refers to many farmers planting pine in Pelorus Sound after 1919, following the Commissioner of Crown Lands advocating for such. We were unable to quantify the area planted during this period, but we did locate an example of what Bowie suggested was common at that time. The first photo shows remnants of a 1910s planted woodlot in the Rai Valley. These trees were planted in pasture sown down after the clearance of native forest for timber harvest in the early 1900s, at 10 foot spacing in 100 tree woodlots by the Couper family (Owen Couper, pers. comm.). The second photo shows woodlots, shelterbelts and ornamentals on the terraces and lower slopes around and in Rai Valley township ca. 1925, indicating early acceptance of pine’s versatility for family farms.

1930s–1960s:

First plantations and commercial woodlot milling

In 1925, Director of the State Forest Service L. McIntosh Ellis announced that 15,000 acres (~6,070 ha) would be afforested with pine in the Marlborough Sounds by 1935 (Ward & Cooper, 1997). This was part of a national planting programme to replace the projected depletion of indigenous timber by the late 1960s. The first large plantation in the Marlborough Sounds was Farnham Forest, established in 1934 over ca. 136 ha in Queen Charlotte Sound/Tōtaranui (Johnston et al., 1981; Sutherland, 2011).

Aside from Farnham Forest, extensive plantations did not eventuate in the Marlborough Sounds. Aerial photos from 1958 verify this, although there were several large woodlots in Tuna, Elaine and Clova Bays (www.marlborough.govt.nz). Bowie (1963) noted pines were used to stabilise slips on hill country farms in places such as Hallam Cove, and also in Pelorus Sound. Bowie observed that woodlot and shelterbelt trees were reaching millable age in the Marlborough Sounds. This accords with the reminiscences of John Harvey who, along

with his brother Hylton, started milling pine in 1957 (John Harvey, pers. comm.). Timber from shelterbelts (e.g. six trees wide by 300–400 yards) around Sounds homesteads were used for construction in Blenheim and Wellington. The first batches were from North West Bay and Titirangi, and pines ca. 70 years old from South East Bay were also milled. A newspaper article recorded 236 m³ of pine milled at the Manaroa Mill in 1960 (Harvey, 2008).

Pine comprised 56% (2,613 m³) of all timber species milled in Marlborough (4,660 m³) in 1950 (Entrican, 1950). The eight mills operating in the region primarily produced rough-sawn timber. It is likely that woodlots and shelterbelts from the Kaituna and wider Pelorus catchments contributed to this (see first and second photos). Leov (1974: 43) noted that the two mills operating in the Rai Valley ‘... are having to cut a good deal of *pinus* [radiata] which is poor timber compared with the good [native timber] ... that the first mills sawed.’

In the wider Pelorus catchment, planting of the Rai State Forest began in 1940 (Entrican, 1950). By 1950, 272 ha had been planted, which included 122 ha in the previous year. Huddleston recalls in the late 1950s planting *P. radiata* at 8 feet by 8 feet (~2.4 m) spacing and Douglas-fir (*Pseudotsuga menziesii*) at 6 feet by 6 feet (~1.8 m) spacing. *Pinus nigra* (Corsican pine) was also planted. It is important to note that the forest was planted for timber production, as evidenced by the 27 ha low pruned in 1950 (Entrican, 1950). Concurrently, soil erosion was a serious issue on hill country in the Rai, Pelorus, Kaituna and Cullens Creek catchments (hereinafter the ‘key catchments’) under pastoral farming (McIntosh, 1940; Bowie, 1963).

1960s–1980s:

Expansion of plantations and first harvesting

In the 1960s, the Forest Service began planting hillsides within the Tinline Valley in the Upper Pelorus, which had at least 80 ha planted in radiata by 1979 (Clout & Gaze, 1984), and then the Whakamarino in the 1970s (Eric Huddleston, pers. comm.; Marlborough

Table 1: Area (ha) in production forestry by LUC class in the Rai, Pelorus, Kaituna and Cullens Creek catchments, and proportion of each LUC class in production forestry. Data courtesy of MDC, derived from LCDB 5

| LUC catchment | Class 1–3 | Class 6 | Class 7 | Class 8 | Forestry area | Catchment total area | Proportion in forestry |
|----------------------|-----------|---------|---------|---------|---------------|----------------------|------------------------|
| Rai | 263 | 621 | 2,649 | 0 | 3,533 | 20,873 | 17% |
| Pelorus (excl. Rai) | 345 | 882 | 5,508 | 280 | 7,015 | 67,173 | 10% |
| Kaituna | 67 | 192 | 2,322 | 368 | 2,949 | 14,602 | 20% |
| Cullens Creek | 11 | 87 | 514 | 0 | 612 | 2,068 | 30% |
| LUC area in forestry | 686 | 1,782 | 10,993 | 648 | 14,109 | 104,716 | 13.5% |
| LUC total area | 9,269 | 7,190 | 64,955 | 23,302 | 104,716 | | |
| % LUC in forestry | 7.4% | 24.8% | 16.9% | 2.8% | 13.5% | | |

District Council (MDC), 1992). The state also planted forests on steep hill country above Tory Channel and around Port Underwood from the 1960s to 1986 (MDC, 1992; Fahey & Coker, 1992). The clear-fell harvesting of Farnham Forest commenced in 1970 and continued into the early 1980s (Johnston et al., 1981; Coker, 1994). The first rotation of the Rai Forest occurred ca. 1979, with the trees going to Burleigh Mill in Blenheim (Eric Huddleston, pers. comm.).

The 1960s also saw the establishment of commercial forests on private land. Planting on marginal lands was encouraged by loans, authorised by the Forestry Encouragement Act 1962 and brought in by regulation in 1967. Loans upon application by local authorities and landowners were repayable at harvest. Farm blocks (up to ca. 100 ha) were planted in the key catchments, and land preparation for afforestation included burning off scrub (Eric Huddleston & Vern Harris, pers. comm.; Sutherland, 2011).

An upsurge in new forest plantings on hill country in the key catchments and the Marlborough Sounds occurred in the late 1980s due to taxation concessions, favourable returns for forestry, and less profitable pastoral farming (MDC, 1992; Sutherland, 2000).

1990s–2020s: Continuous harvest

By 1992, 9,500 ha were planted in the Marlborough Sounds and 9,100 ha in the key catchments (MDC, 1992). MDC (1992) projected a threefold increase in harvested log volumes (sawlog and pulp) from the late 1990s as the upsurge in plantings from the 1960s and 1970s matured (Figure 1). The volumes were projected to remain elevated into the 2000s.

By 2018/19, plantings in the key catchments had increased by ca. 5,537 ha and by ca. 2,811 ha in the Marlborough Sounds (Land Cover Database (LCDB) version 5, MDC unpublished data). Forestry (predominantly radiata pine) covered ca. 12,311 ha in the Marlborough Sounds (Pelorus and Queen Charlotte Sounds, and Port Underwood), and ca. 10,548 ha of the Pelorus (including the Rai), 2,949 ha of the Kaituna and 612 ha of Cullens Creek (Figure 2).

Forestry is predominantly situated on steepland yellow-brown soils, prone to slips and sheet and rill erosion once the vegetation cover is removed (Johnston et al., 1981; Laffan & Daly, 1985). Most forestry in the key catchments is on LUC Class 7 (Table 1, Figure 2a), and in the Marlborough Sounds (Figure 2b). These areas are primarily zoned orange (high risk) for erosion susceptibility in the National Environment Standard for Plantation Forestry (Basher & Barringer, 2017).

The risk of soil loss is elevated in the five to eight-year 'window of vulnerability' between the decay of harvested tree root systems and the establishment of the next tree crop and/or seral plant species (O'Loughlin & Watson, 1979). Google Earth time-lapse imagery shows extensive areas of clear-fell harvesting throughout

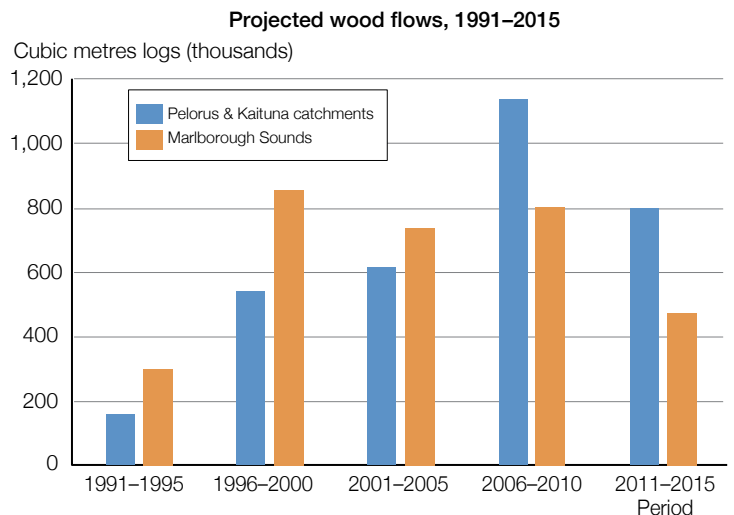


Figure 1: Projected plantings in the main contributing catchments to Pelorus Sound/Te Hoiere (Zone 7 in MDC, 1992) and the Marlborough Sounds (Zones 3–6). Redrawn from MDC, 1992 (Appendix Figures 3–7)

the Marlborough Sounds and the key contributing catchments at any one time over the last 20 years. Across the landscape, the window of vulnerability is always open, representing a plausible and ongoing source of high sediment volumes into coastal waters (Johnston et al., 1981; Fahey & Coker, 1992; Handley et al., 2017).

Summary

Radiata pine has a history in the study area dating back to the late 1800s as ornamentals, woodlots and shelterbelts. The first commercial plantation in the Marlborough Sounds was established in the 1930s. The Forest Service planted forests in the Rai, Upper Pelorus, Whakamarino, Tory Channel and Port Underwood between the 1940s and 1980s. Planting increased on privately-owned hill country with forestry encouragement loans from the 1960s, with an upsurge after the cessation of pastoral farming subsidies in the late 1980s.

Commercial harvesting commenced in 1970 in the Marlborough Sounds and ca. 1979 in the Rai Forest. From the late 1990s, widespread harvesting has occurred throughout different parts of the Marlborough Sounds and key contributing catchments, meaning the window of vulnerability is perpetually 'open'. This represents a plausible source of high sediment volumes into coastal waters after pine harvesting on the predominant erosion-prone hillsides.

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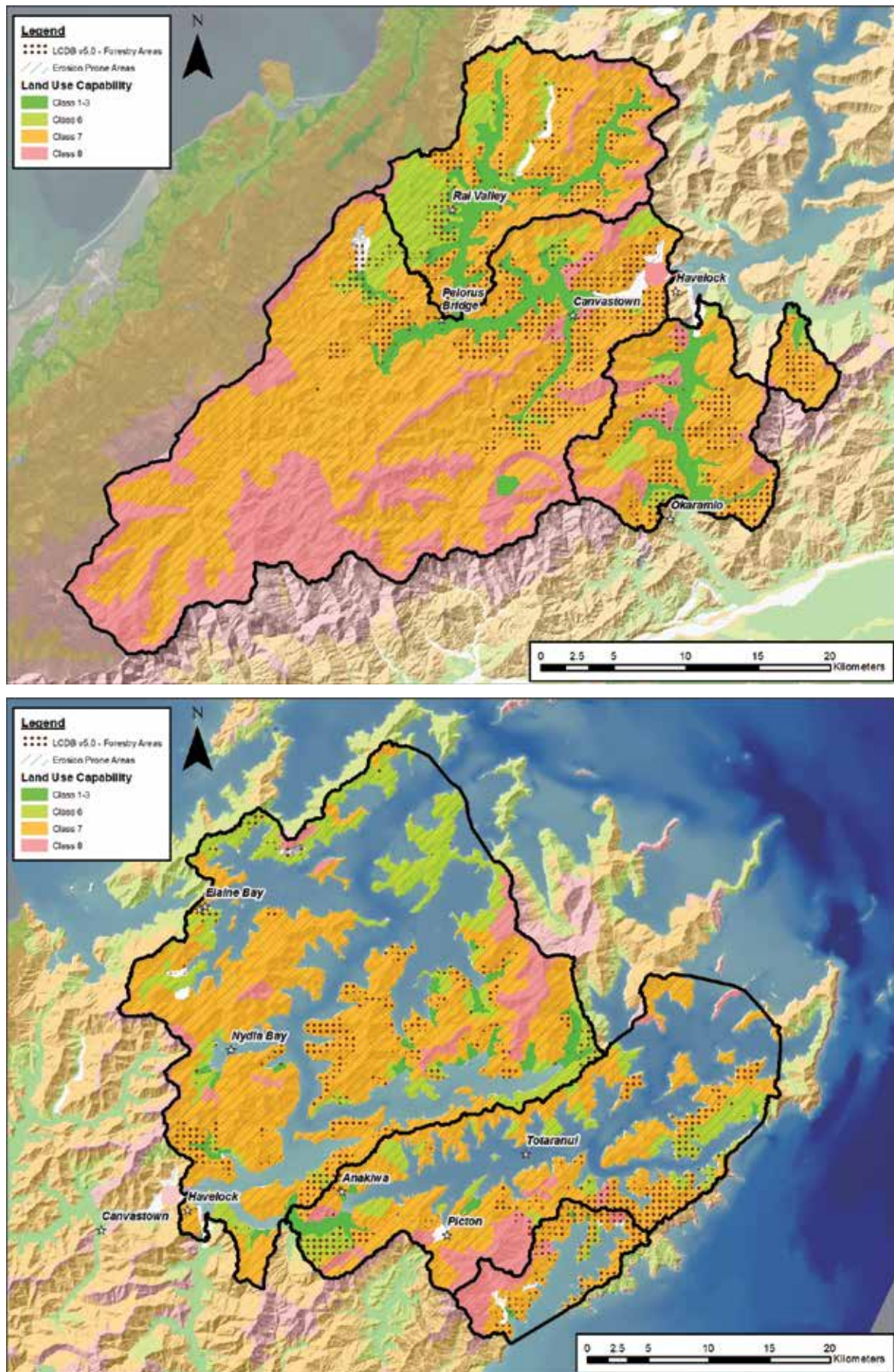


Figure 2: 2(a) Top – Plantation forests in the main contributing catchments to Pelorus Sound/Te Hoiere (black dots) overlaid on LUC classes; (2b) Bottom – Plantations in the Marlborough Sounds. Data derived from LCD8 5 courtesy of MDC

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