

General Conclusions used to create a Land Use Projection for the 2020 Baseline

On 23 September 2020 a workshop was held with the Technical Advisory Group (TAG) for The Southland Economic Project. The purpose of this workshop was for the Technical Advisory Group to review the baseline scenario for Southland (i.e. a forecast about the future without further freshwater management) that it created in 2016 for The Southland Economic Model.

This baseline scenario is essentially a land use projection over the next generation (up until 2046). This short paper contains the set of general conclusions that were developed following this workshop. The conclusions are based on current knowledge about the future, and include some changes that are in train but are not yet fully apparent. This current knowledge is summarised below as factual statements. Importantly, however, the conclusions put to one side any changes that are anticipated to stem from the setting of limits for fresh water. The reason for this exclusion is because it is the impacts of these changes that the baseline scenario will be used to measure against.

Factual statements

- Even without limit-setting, the region's environment has constraints - there are bounds to how much it can take before our natural capital, and therefore its use, declines.
- There were considerable changes in land uses across the landscape in Southland from 1995 to 2020 (the past generation). However, consents for new dairy farms have only been required since 2012 (when Plan Change 13 was notified) and conversions to dairy have slowed over recent years. In 2014, 35 consents were granted for new dairy farms and in 2015 there were 22 consents granted. The Southland Water and Land Plan was notified in June 2016 and was replaced 22 months later by the decisions version in April 2018.
- The changes in land use slowed from 2016 to 2018 and then slowed again from 2018 to 2020. The ratio of consents for new dairy farms to expanded dairy farms has also grown over time: from 1:5.4 consents under the notified version to 1:9.5 consents under the decisions version. As a general observation, most consents for additional dairy farming appear to now be triggered by an expansion to the dairy platform, rather than a new conversion, and tend to reduce overall stocking rates.
- Since 2016, the number of dairy herds has remained stable, while cow numbers and grazing area have both increased slightly but at a slowing rate (~1% annual increase in total cows and 1.5% annual increase in grazing area). There is less certainty about trends in arable and forestry. There have been increases in urban area mostly in Te Anau and some in Invercargill. Little transfer from high country pastoral lease to conservation estate.
- In the Environment Court process, it was generally accepted by expert witnesses that the quality of water in many waterbodies in Southland is degraded. The Environment Court has indicated, where scope exists in the appeals lodged, the proposed Southland Water and Land

Plan will become more stringent before limit-setting in order to maintain water quality ('holding the line' was the Plan's original aim), and improve water quality where it is degraded prior to the Freshwater Management Unit process.

- A driver of conversions from drystock farms to dairy farms was the prospect of capital gains. Recent declines in the market values of dairy farms and changes in bank investment policy for agriculture have reduced the opportunity for capital gains. These factors and debt levels are also reducing farmers' ability to borrow for environmental mitigations. The costs of actions already required, such as riparian fencing, are being built into the market values of all farms.
- The position of local rūnanga is now to not approve to any further dairy expansion. As well, local rūnanga are actively promoting wetland restoration (e.g. Waituna).
- In future, most intensive winter grazing is likely to require a consent as the intensive winter grazing regulation in the National Environmental Standards for Fresh Water is implemented. An analysis of slope, rainfall and soil drainage completed by Environment Southland for the region¹ indicated between 90% and 95% of properties that had winter forage crop in 2017 are likely to need a consent. In Ireland, which is similar to Southland (e.g. climate, farming systems), pugging restrictions by the EU lead to a decline in intensive winter grazing.
- The global climate change modelling available in 2016 from the Intergovernmental Panel on Climate Change is becoming increasingly pessimistic. For Southland, NIWA predicts: warmer weather all year round, drier summers with extended periods of higher temperatures; and increasing average annual rainfall, mostly in winter and spring, that occurs in more intense events. Coastal flooding will steadily increase, including incidents of pure tidal flooding. Also increasing will be the frequency, size and duration of severe weather events, with more events that are unprecedented.²
- Estimates using the Southland Land Use Map suggest that between 2007 and 2017 plantation forestry in Southland increased by roughly 6,000 hectares (or just under 7%). This increase largely occurred in the Matāura FMU³ (+27%), where forestry is closer to processing facilities and ports. There was an increase in the Waiau FMU (+3%) but more or less static in the Aparima and Oreti FMUs (1% or less). By 30 September 2020, the One Billion Trees Fund had approved grants for 829 hectares of trees (24% native and 76% exotic) in the region.
- Over the last 7 years, farm forestry blocks have tended to be put into pasture after harvest instead of being re-planted. However, there are two recent examples of dairy farming companies buying drystock farms to use to offset their carbon emissions (noting there is a difference between biogenic and fossil-fuel methane). Castlerock Dairies purchased a farm near Lumsden and is planting over 400 ha into pines. Woldwide Dairies purchased a farm with forestry in the Waiau catchment on with the plan to offset carbon emissions from five other farms.

¹ Pearson, L., Couldrey, M., and Rodway, E. (2016) *Spatial analysis of winter forage cropping in Southland and the implications for water quality management*. Technical Report. Publication no. 2016-13. Environment Southland, Invercargill.

² <https://www.es.govt.nz/about-us/news?item=id:26gju0toa1cxbymvk9a7>

³ Freshwater Management Unit.

General conclusions

These conclusions are the Technical Advisory Group's best guesses about what remains of the time period for 2016 to 2046 and, as such, are all conditional on current knowledge:

- In agriculture, the land use changes to dairy will continue to slow from 2020 to 2025 as a result of the National Environmental Standards for Fresh Water (NES-FM), the Zero Carbon Act 2019 (ZCA), the Environment Court process for the Southland Water and Land Plan, and the position of local rūnanga to further dairy expansion.
- Agricultural land uses will be relatively stable until 2045 (i.e. over the next generation). There may be an increase in changes of ownership for dairy farms but the existing farms are likely to remain in dairy at least for the lifespan of their infrastructure (e.g. milking sheds and effluent ponds). There will be some shift from agriculture to forestry (plantation and farm forestry) but it is relatively difficult to forecast, especially without an industry group to give an agreed position.
- The loss of land from inundation over the next 25 years will be relatively limited, but if it does occur then the coastal zone between Invercargill and Riverton is at risk. However, more rain is expected overall and with more variability within a year (more storm events and droughts), and fewer frost and snow days. Water quantity issues could be more of an issue than the cold in the future – there are likely to be increasing challenges with pasture management (softer paddocks makes it difficult to feedout) and establishing spring crops.
- Dairy farmers are unlikely to invest in wintering barns more than is currently occurring. Existing restrictions on excess nutrients can be a driver but requirements to reduce biogenic methane in the Climate Change Response (Zero Carbon) Act 2019 will be a constraint. Farmers may be more willing / able to accept lower dairy production and profit rather than building barns, increasing debt and adding complexity. However, there will be cheaper innovative off-paddock solutions but depends on banks' lending policies and interest rates.
- In the future it is anticipated that there will be few new dairy farms and any new dairy land will come from an expansion of existing farms to reduce stocking rates (i.e. de-intensification that may also take advantage of lower land prices). On a broad scale, fewer cows will go elsewhere (within the region or further afield) to graze during winter, staying on either the dairy platform or a run-off block associated with the dairy platform (i.e. a rationalisation of dairying).
- There will be a return to more diverse farming systems, including the use of different pastures, to improve resilience as conditions become more variable (i.e. changes within a land use rather than changes between land uses). In particular, more mixed livestock (drystock and dairy) operations (e.g. mixed dairy and beef farms), more arable and farm forestry. Some increase in demand for high-value meat products.
- From 2020 to 2025 there will be little growth in deer numbers (i.e. static herd size), but the number of farms with deer will decrease and average farm sizes will increase. From 2025 to 2050 the proportion of within existing drystock farms will be relatively stable (the nature of "drystock" farms is that they can run multiple species interchangeably). This stability will be

the result of market development, particularly in China and in the retail sector (venison) and health foods (velvet).

- Increasingly variable climatic conditions will make both the survivability of young livestock in spring and managing feed demand and supply across a year more challenging. Livestock numbers will be starting to decline by 2050.
- The use of intensive winter grazing will decline as a result of new regulations in the National Environmental Standards for Fresh Water. This decline will lead to farmers having to choose between reducing stock numbers and increasing the use of off-paddock facilities to feed stock on.
- There is anecdotal evidence that drystock farmers are planning to move away from winter grazing or reducing their area to fall within the 10% threshold in the NES-FW. Consequently, the supply of intensive winter grazing for dairy stock is likely to decline and prices increase as a result of compliance costs. There are also examples of deer farmers re-purposing farm buildings (e.g. shearing sheds) as wintering barns.
- The 2016 baseline forecast little change in the area of land for the three main species of plantation forestry: radiata pine, Douglas fir, and eucalypts. Forestry in Southland is unlikely to follow the recent trend in the North Island of afforestation on more productive agricultural land. However, there will be more plantation forestry in hill country and areas with peat, such as Waituna. Any new forestry is more likely to be located near existing large blocks (1,000 – 5,000 ha) where roading infrastructure already exists.
- There may be a shift in thinking about the value of farm forestry from wood to carbon, and at a larger scale than the established small woodlots, particularly on dairy farms. There may be more joint ventures between landowners and owners of investment capital. Any land converted to forestry is likely to remain as such because of the difficulty in returning it to pastoral land, especially carbon credits are being claimed.
- The 2016 baseline for horticulture forecast a 50% increase in land area, which is now considered to have been unrealistic. Currently, there are 10 growers and just two with more than 20 hectares (a total of ~500 ha across region), which is a small land area at a regional scale. The dominant crops are carrots, potatoes and parsnips, which are all grown for the domestic market and so future growth is linked to population growth. Distance to processing facilities and competition with dairy for suitable land constrains growth, although these dynamics may change in the future.
- There may be more arable land if demand for arable crops grows to feed for the cows now staying in the region and there is a return to forage crops with lower yields. It may need an additional 7,000 ha of arable crops (roughly 10% of current forage crop extent) but not necessarily all on arable farms. However, an increase in cut and carry for off-paddock solutions has challenges in terms of logistics and transport cost, as well as heavy machinery on paddocks. Any increase in human crop food will need processing capability to increase.

- The effects of climate change may create opportunities for new arable and horticultural crops, such as grapes, apples, or berry fruit. These opportunities may be driven by developing markets (reflecting changes in consumer preferences) or technology (e.g. genetics for growing crops in cooler climates).

Summary for 2020 Baseline

In the baseline, land uses are relatively stable over the next generation. It is forecast that any changes in land use will occur within a farm rather than changes from one farm to another:

- More farm forestry across some pastoral farms (if claiming carbon credits then may be evenly distributed on hill country across the region);
- More arable farms and arable land on some pastoral farms (+7,000 hectares by 2035 years);
- A 50% increase in horticultural crops, although the current extent is relatively small compared to other land uses;
- The proportion of deer on drystock farms will be stable and, although there may be fewer farms, the remaining farms are likely to be larger;
- Minimal increase in consented cow numbers and lower stocking rates on dairy farms; and
- Less dairy support land (e.g. independent graziers) with a compensatory increase in dairy farm land to reduce stocking rates on the dairy platform⁴.

⁴ An analysis may be undertaken to determine the proportion of dairy farms with suitable land near them to expand and make it a closed system. Where there is little or no suitable land nearby then options may include reducing overall numbers, using off-paddock systems, or paying more for grazing on drystock farms.