Case Study 30

Weasenham and Sennowe Estates w/ Fulmodeston Severals, Norfolk

Location and ownership of woodlands

This case study deals with woodlands on three private estates in Norfolk where quality crops of diverse conifers are grown under alternative silvicultural systems:-

1. Weasenham Estate, by Kings Lynn [NGR TF 8xx2xx] which is owned by the Coke family. Area of woodlands under ATC is 75 ha (~185 acres).
2. Sennowe Estate, by Fakenham [NGR TF 9xx2xx] which is privately owned by the Cook family. Area of woodlands under ATC is 245 ha (~600 acres).
3. Fulmodeston Severals, by Fakenham [NGR TG 0xx2xx] which is owned by Mr . E. Brun of Fring Hall. Area of woodlands under ATC is 76 ha (~185 acres).

All of these woodland benefit from close attention of enthusiastic owner-managers, drawing inspiration from original plantings and selection silviculture practised by the Coke family (Earls of Leicester) from 1880 onwards. Weasenham and Sennowe are mainly long-established plantations, Fulmodeston Severals is a PAWS site.

Significance/ reasons for selection as case-study example

These sites were selected as case-studies within this project for two main reasons:-

1. Weasenham Woods are a classic type example of well-developed alternative silviculture in Britain, being one of the few examples of true single-tree selection. The continuing interest and direct involvement of the Coke family over the past century has contributed to an exceptional example of successful ATC. Diverse and valuable stands of a wide range of productive conifers, established on former heathland, are grown to large size for specialist outlets (adoption scenarios 7, 9, 10). Sennowe and Fulmodeston show similar ATC approaches at an earlier stage.

2. In recent years these woodlands have come to have another important function in terms of their record of using a wider range of alternative conifer species for productive forestry in the dry lowlands of eastern England (some conventionally being regarded as drought-intolerant, such as Sitka spruce, grand fir and hemlock). This is of value in the light of current pressures to diversify lowland pine stands.

Owner objectives for management (including adoption of ATC systems)

These woodlands are all primarily managed for timber production and financial income therefrom. Estate amenity is also a significant factor at Weasenham and Sennowe. Selection forestry in mixed conifers has been practised at Weasenham for many years out of a combination of silvicultural curiosity by the owners and a belief that this was the optimum way to establish permanent forest cover on an open heathland site. Fulmodeston Severals was formerly part of the Earl of Leicester's estates and similar management was practised there for many years - the current owner is adapting ATC methods to deliver his objectives. The woodlands at Sennowe estate are undergoing long-term transformation to alternative silvicultural systems.

Biophysical characteristics of the sites

The Weasenham site is on level ground at 60-70 m asl. The climate is warm and very dry [AT_5 of ~1687 dd, MD of 209 mm, annual rainfall of 693 mm]. A DAMS score of 14 reflects moderate exposure. The solid geology is Cretaceous chalk but soils are developed from acid peri-glacial sands [ESC SMR Slightly Dry, ESC SNR Poor]. Forestry access is good, but with a need to avoid recreational facilities on site.

The Sennowe site is on the sides of a gentle valley at 20-50 m asl. The climate is warm and very dry [AT_5 of 1716 dd, MD of 217 mm, annual rainfall of 696 mm]. A DAMS score of 11 reflects topographical shelter of the site. The solid geology is Cretaceous chalk but soils are developed from alluvial sedimentary deposits [ESC SMR Moist, ESC SNR Rich]. Forestry access is good in most parts, locally soft.

The Fulmodeston Severals site is on level ground at 60-70 m asl. The climate is warm and very dry [AT_5 of 1668 dd, MD of 211 mm, annual rainfall of ~668 mm]. A DAMS score of 14 reflects moderate exposure of the site. The solid geology is Cretaceous chalk but soils are developed from drift deposits of heavier texture [ESC SMR Moist, ESC SNR Rich]. Forestry access is generally good over access tracks.

Stand history and current composition

These woodlands are stocked with plantations of a variety of conifer species with some hardwoods. At Weasenham, stocking mainly dates from plantings onto open heathland by the Earls of Leicester between 1880 and 1920, with some later additions. Earlier plantings were mainly of pine, larch, spruce and Douglas fir, but later introductions of shade-tolerant western red cedar, western hemlock and *Abies* firs have played an increasingly important role in the woodlands. There are also smaller components of unusual conifers such as coastal redwood, Japanese red cedar and incense cedar, and some native and introduced hardwoods. Premium mature stems of these species are now found in intimate mixtures with complex structure (with only subtle residual grouping) and there is abundant regeneration of most tree species grown on site. At Fulmodeston Severals, similar plantings by the Earls of Leicester have developed into diverse woodlands of Douglas fir, larch, Corsican pine, western red cedar and western hemlock, but with a greater tendency to a group structure. There is abundant natural regeneration in parts, together with some replanted areas. At Sennowe plantations contain oak, beech and other hardwoods up to 250 years old, Douglas fir and Corsican pine dating from c. 1880 onwards, and also significant components of larch, various pines, western red cedar and coastal redwood. Natural regeneration has begun to arise more recently and is being tended to restock stands, together with localised small coupe felling/ replanting.

Silvicultural treatments applied to date and intended future silviculture

The Weasenham woods are operated on a single-tree selection basis with thinning/ final harvest being essentially indistinguishable. Stems are felled on a 3-5 year cycle to regulate stand basal area between 26 and 32 m^2/ha. This system has been in force for many years and allows for adequate natural regeneration of most desirable species, including Douglas fir, but may lead to long-term decline in the proportion of pine and larch without specifically favouring these. Little new planting has been undertaken in recent years. Mature stems of large-diameter and good form are sold to specialist local

markets. As expected Douglas fir, pine and larch are in demand, but Weasenham also has an enviable record of being able to sell large-section western hemlock and *Abies* firs. Some timber of the latter species has been used on site for the construction of recreational facilities - the owner operates a high-wire adventure visitor facility. At Fulmodeston Severals and Sennowe, a wider variety of silvicultural approaches have been applied to restore active management over the past 30-50 years, including shelterwood thinning, group selection with natural regeneration and some coupe-felling with replanting. Main products are Douglas fir, larch and pine for beams and planking, with western red cedar and coastal redwood for external carpentry/ cladding Some hardwoods are also produced for both timber and woodfuel at these sites.

Evaluation of current silvicultural status in terms of ATC adoption/ regeneration

The long-standing and sophisticated implementation of alternative silvicultural systems at Weasenham, with a complex structure and near complete reliance on natural regeneration places this site into ***developmental category 1*** (complete or near-complete transformation). At Fulmodeston Severals, ATC working has been actively resumed over the past 30 years, following an interruption in the post-war decades, and hence this site is in ***developmental category 2*** (progressive/ mature adoption) with significant natural regeneration of a range of species. The same applies to parts of the Sennowe woodlands after 50 years of working, with the remainder in ***developmental category 3*** (early-stage adoption) with more recent inception of natural regeneration and some replanting. It is likely that ATC application at these estates will continue.

Commentary on inventory and monitoring protocols/ demonstration potential

ATC management at these sites relies on the long experience of the owner-managers "assessing by inspection" rather than implementation of any detailed enumeration protocols. This makes replication potentially more difficult were the personnel to change. Weasenham has hosted many organised/ guided forestry visits over the years and similar activity has been initiated recently at Sennowe and Fulmodeston. Given the nature of these private woodlands, any visits must be pre-arranged with owners.

Commentary on economic and operational implications of ATC adoption

These mature woodlands produce high value individual stems of a range of conifer species from selection management. As natural regeneration is now the main method of restocking, the main operating inputs are in terms of protecting and tending that regeneration rather on replanting costs. The owner-managers of these woodlands choose to do much of that work personally rather than by engaging external contractors, hence it is very difficult to make meaningful economic comparisons with a situation where woodlands are managed on a clearfell/ replant basis with cash costs.

Other relevant field examples recorded within the project

Due to the mix of shade-tolerant coniferous species used for productive forestry under ATC in this example, there are obvious comparisons with Cirencester Park Estate (Case Study 2), Tavistock Estate and Dartington Hall (Case Study 18), Bowhill and Eildon Estates (Case Study 19), Ffrwdgrech Estate (Case Study 5) and Longleat Estate (Case Study 14). Weasenham is almost unique among the older woodland examples in having been established from the outset with ATC explicitly intended.

Photographic record

Left: high value mature conifer stems - Douglas fir, larch, hemlock

WEASENHAM WOODS

Right: experimentation with alternative conifers for dry climatic conditions - incense cedar

Left: high value mature conifer stems - Douglas fir, larch, hemlock

WEASENHAM WOODS

Right: experimentation with alternative conifers for dry climatic conditions - incense cedar

Left: reliance on natural regeneration of desirable species

WEASENHAM WOODS

Right: on-site use of less valuable species - grand fir and hemlock

Left: experimentation with alternative conifers for dry climatic conditions - coastal redwood

SENNOWE ESTATE

Right: natural hardwood regeneration under mature pine and larch crops offers resilience

Left: group selection working with defence of natural regeneration

SENNOWE ESTATE

Right: small coupe working with replanting using Corsican pine - Sitka spruce estate mixtures

Left: high value mature conifers with regeneration - Douglas fir

FULMODESTON SEVERALS

Right: group working with western red cedar