

# Refining forestry in GHG inventories and projections: UK experience

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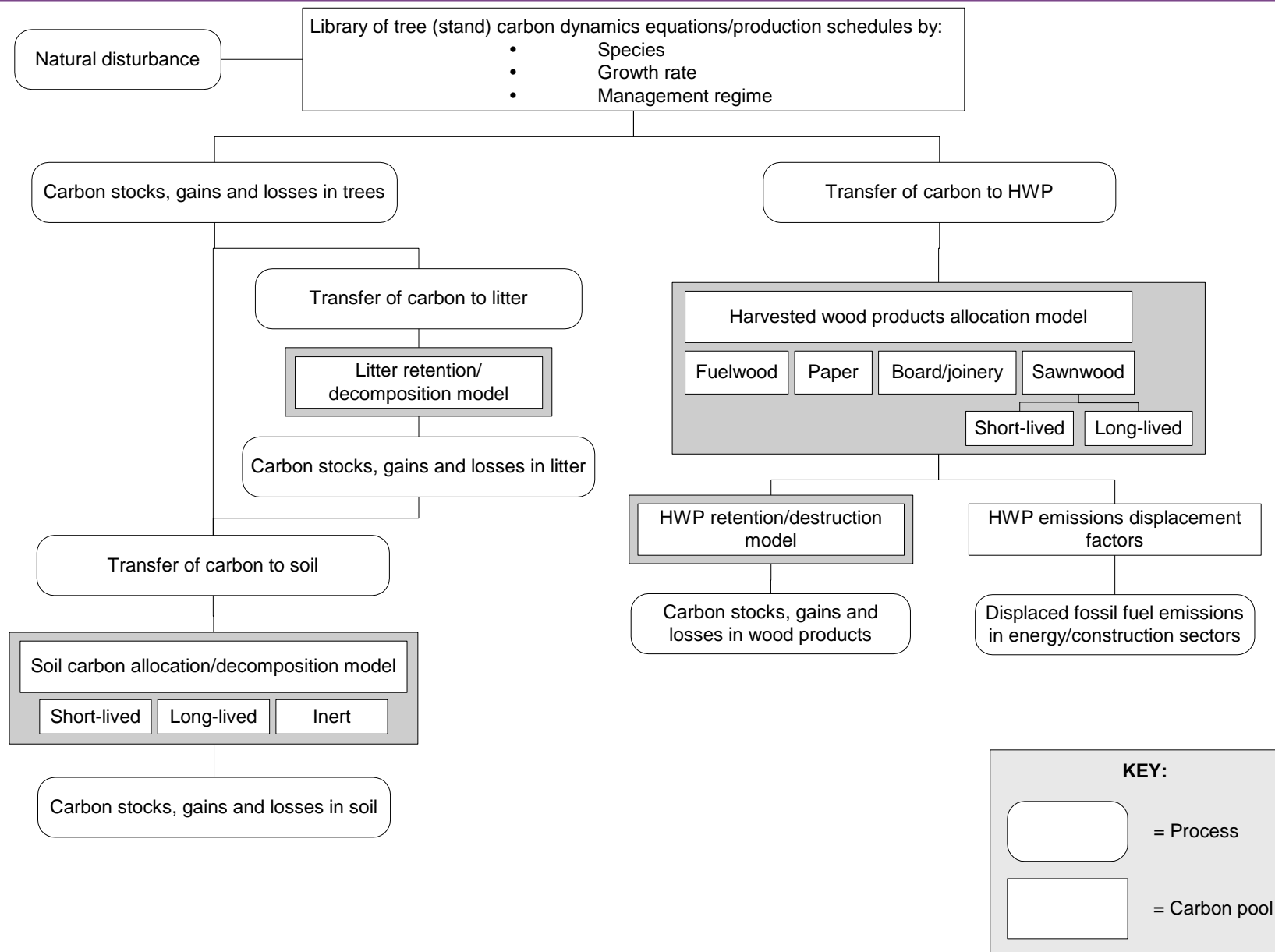
For England, Wales, Scotland, Northern Ireland:

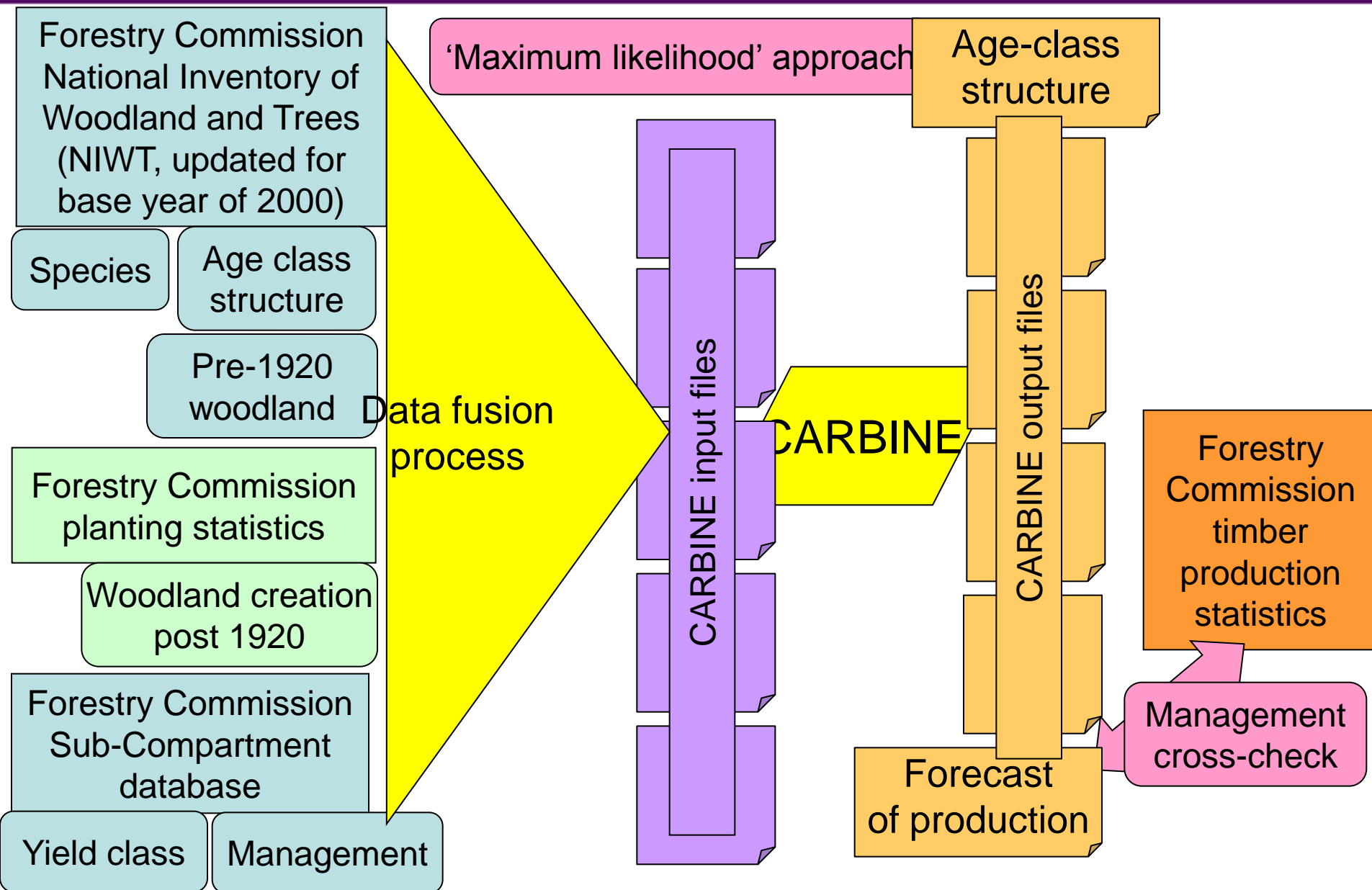
- Forest areas created since 1921 only (roughly 50% of the UK forest area)
- Conifer/broadleaf area by year of planting
- All conifers represented by Sitka spruce, all broadleaves represented by beech
- Growth rate (yield class) by "mean estimate" for Sitka spruce and beech
- All forest areas assumed to be thinned and clearfelled with restocking/replanting.
- Sitka spruce rotation = 59 years; beech rotation = 90 years
- Soil (simplistically)
- Deforestation and disturbance (simplistically).

For England, Wales, Scotland, Northern Ireland:

- All forest areas in UK
- Species composition (e.g. 10 major conifers, 6 major broadleaves)
- Age class distribution
- Growth rate (yield class) distribution for species
- Range of management practices (by species)
- Soil (robustly)
- Deforestation, disturbance (robustly).

Will illustrate for the example of Wales ...





“Fused” data, NIWT and FC sub-compartment database (extract)

COMBINED mapped Spp. Areas (hectares) for Carbine input

Species	Oak		Douglas fir		Sitka spruce		W. hemlock	
GYC/Owner	Other	FC	Other	FC	Other	FC	Other	FC
0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
4	14630	1905	0	0	0	0	0	0
6	16850	2194	0	0	650	1383	0	0
8	2223	290	38	39	1097	2336	0	0
10	0	0	157	160	2608	5551	0	0
12			740	754	6094	12969	94	156
14			1245	1269	6022	12817	105	174
16	0	0	1533	1562	4345	9247	227	376
18	0	0	924	941	2560	5448	265	440
20	0	0	375	382	1394	2967	180	299
22	0	0	190	193	658	1401	105	174
24	0	0	155	158	565	1202	119	198
26	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0
All	33703	4389	5357	5458	25993	55322	1094	1816

## Based on FC sub-compartment database

COMBINED SPECIES GROUPS FOR		% of category/species		
Species	Thin (Fell)	No thin (no fell)	No thin (fell)	LISS
BE	3.2	13.2	5.7	77.9
OK	9.0	20.4	4.1	66.4
PO	6.6	14.3	3.0	76.1
RON	20.8	5.2	3.4	70.7
SAB	8.6	27.5	10.6	53.3
CP	22.3	4.3	8.8	64.6
DF	38.5	6.9	7.6	47.0
EL	7.1	6.4	9.8	76.6
GF	41.6	7.7	10.6	40.1
JL/HL	25.5	7.6	15.3	51.7
LP	19.0	7.6	55.9	17.5
NF	38.7	17.8	23.3	20.2
NS	36.0	9.9	18.2	36.0
RC	27.1	5.9	32.8	34.2
SP	17.2	8.3	19.9	54.6
SS	53.9	7.7	24.4	14.0
WH	41.7	4.1	34.5	19.7
HAZ (not used further = YC = 0)				
SUM of "productive area" to use = Total area - other/open in non-spp. Area -				

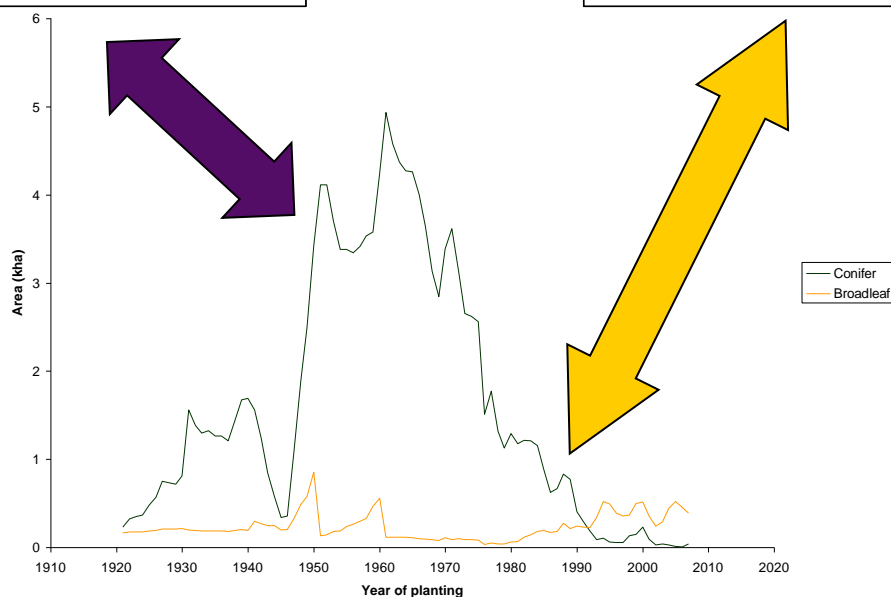
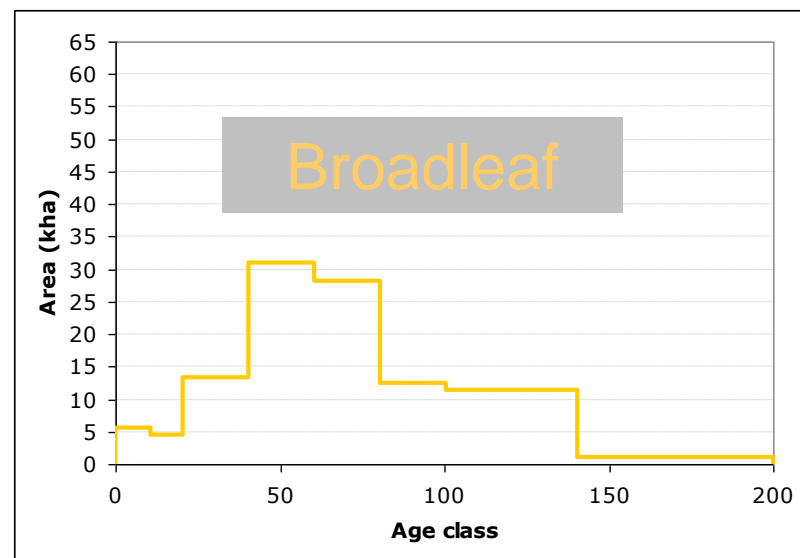
Essentially shorthand term in UK for continuous-cover management

### Rotations:

- Based on yield model (conifers) or silviculture (broadleaves)
- Then range defined by -X years and +Y years (based on 'expert knowledge').
- Also consideration of actual production levels.

Different percentages Assumed for non-FC forests

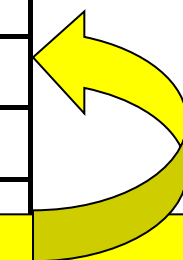
## From National Inventory of Woodland Trees



FC data on  
“new planting”

From age	To age	From yr	To yr	Area (kha)	
				New planting	Inventory
0	9	1991	2000	1.4	31
10	19	1981	1990	8.9	21
20	29	1971	1980	21.6	24
30	39	1961	1970	39.4	38
40	49	1951	1960	36.8	30
50	59	1941	1950	3	8
60	69	1931	1940	5.9	4
70	79	1921	1930	4.3	1
80	89	1911	1920	0	0
90	99	1901	1910	0	0
100	139	1861	1900	0	Older areas significant for broadleaf forests
140	250	1750	1860	0	

**29.6 kha of inventory must be restock (some pre-1920)**



**3.3 kha of new planting must have been restocked**

Older areas significant for broadleaf forests

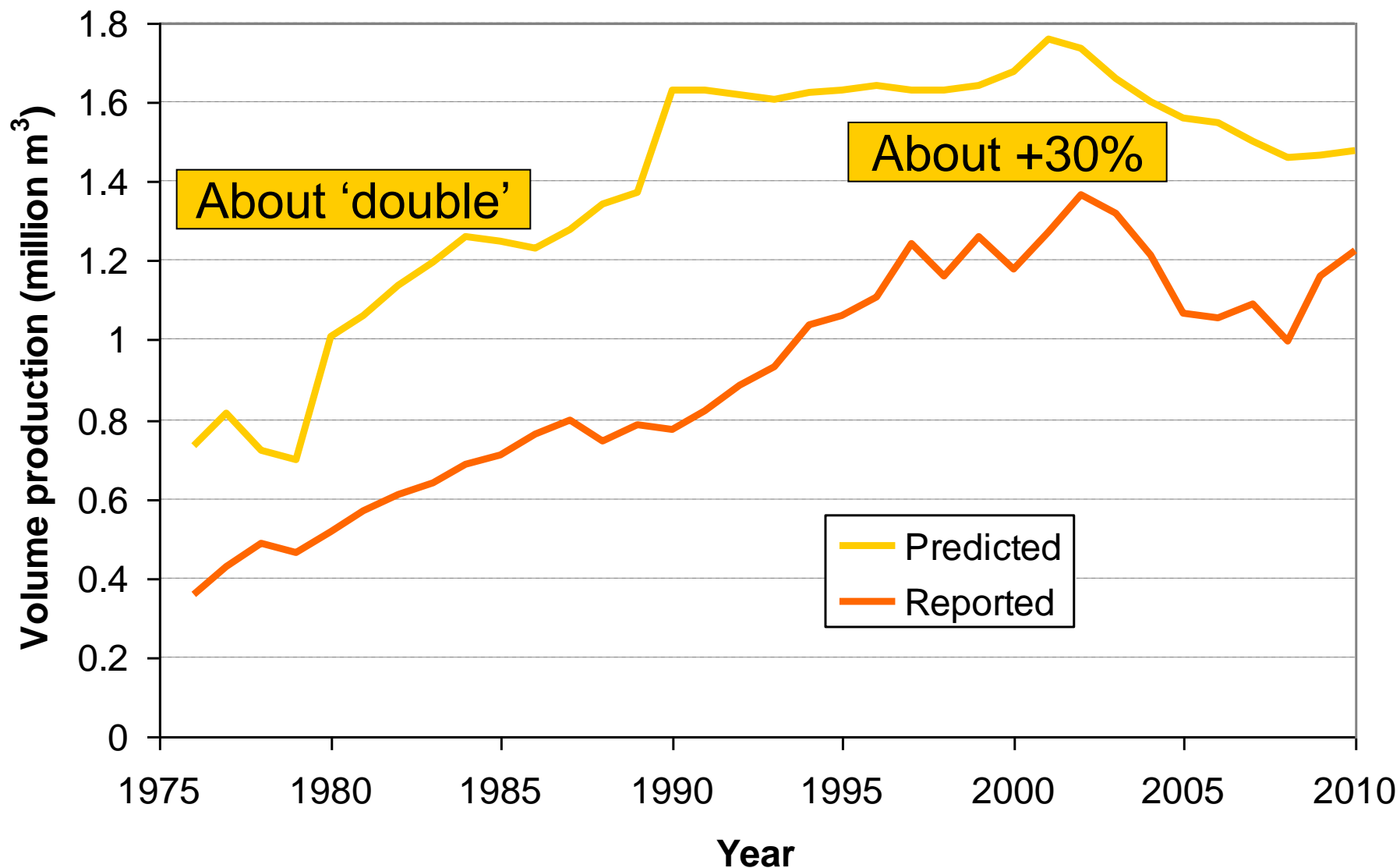
				Area (kha)	
From age	To age	From yr	To yr	New planting	Pre-1920 restock
0	9	1991	2000	1.4	21.9
10	19	1981	1990	8.9	7.2
20	29	1971	1980	21.6	1.6
30	39	1961	1970	38	0
40	49	1951	1960	30	0
50	59	1941	1950	3	5
60	69	1931	1940	4	0
70	79	1921	1930	1	0
80	89	1911	1920	0	0
90	99	1901	1910	0	0
100	139	1861	1900	0	0
140	250	1750	1860	0	0

**Must have a rotation of at least age+1 years**

## Forestry Commission statistics on wood production

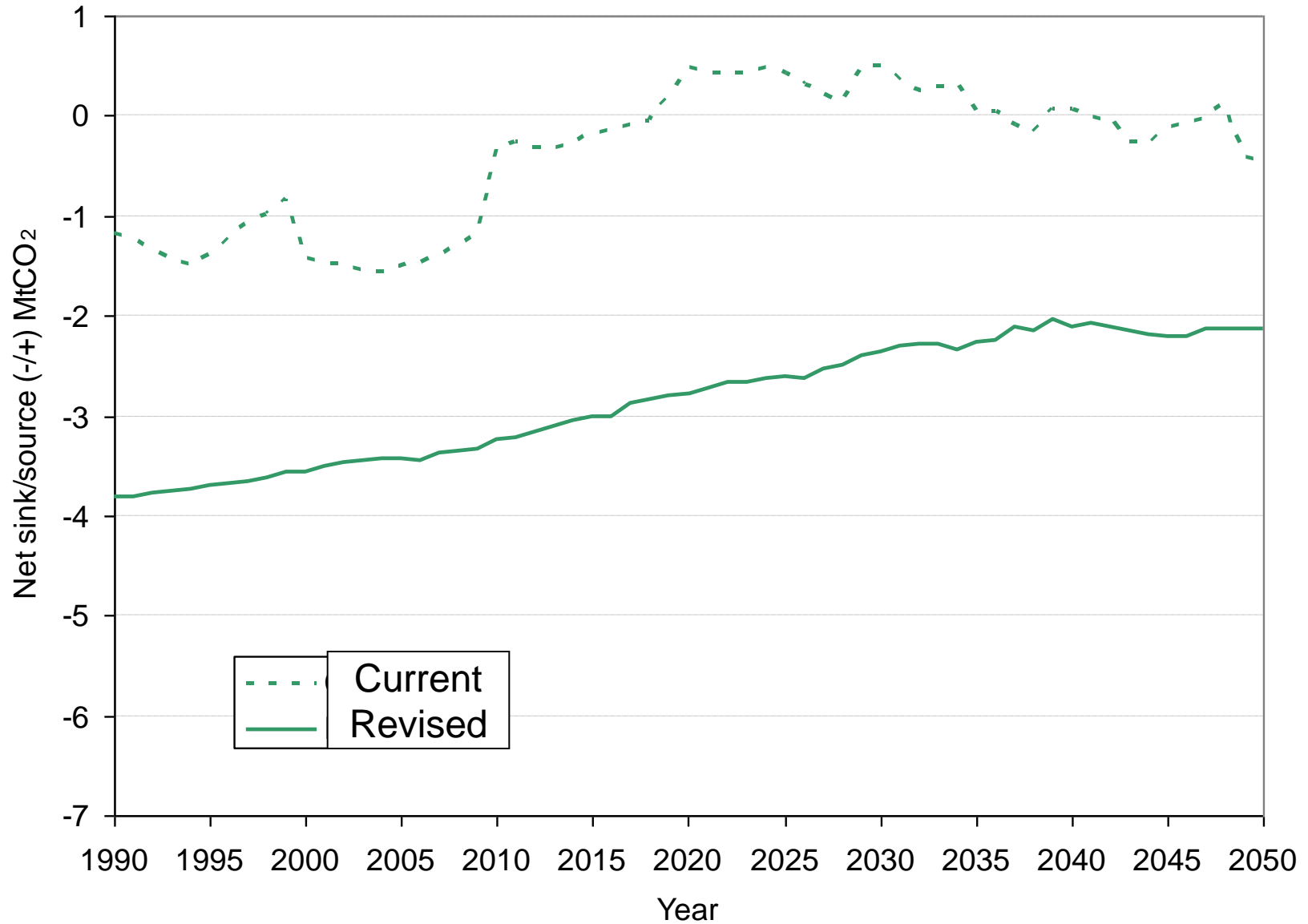
W.1 Wood production: Wales, 1976-2010 (provisional)								
						thousand green tonnes	thousands cubic meter	
Year	Softwood			Hardwood			Softwood	Hardwood
	FC	Non FC	Total softwood	FC	Non FC	Total hardwood	Total softwood	Total hardwood
1976	286	40	326	9	39	48	359	48
1977	344	46	390	9	43	52	429	52
1978	368	72	440	9	36	45	484	45
1979	360	59	419	9	36	45	461	45
1980	425	46	471	9	39	48	518	48
1981	466	49	515	9	39	48	567	48
1982	499	57	556	9	30	39	612	39
1983	499	82	581	9	41	50	639	50
1984	540	82	621	9	41	50	683	50
1985	564	82	646	9	36	45	711	45

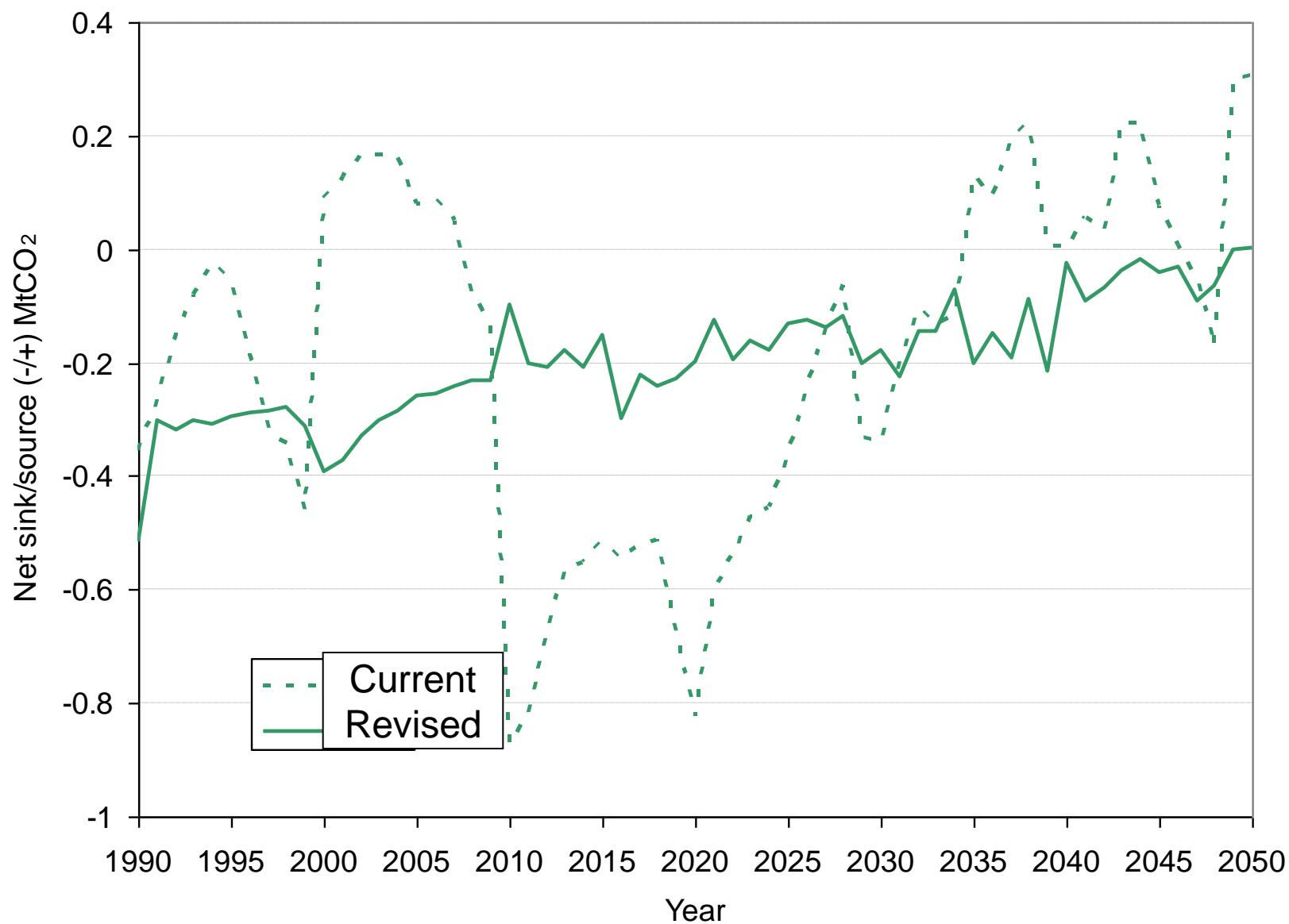
2007	584	409	993	2	17	20	1,092	20
2008	556	350	906	2	17	19	997	19
2009	717	337	1,054	8	16	24	1,159	24
2010	644	471	1,114	4	20	24	1,225	24



## Why is predicted production so much higher than reported?

- Gross:net area
- In production:not in production (private sector)
- Thin:no-thin (private sector, historical for all)
  - Production 'held back' in private sector?
- Yield class assumptions (private sector)
- New planting:pre-1920 forests (FC:private sector)
- Under-reporting in production statistics
- (Previous slide was an old result – has been refined more recently)



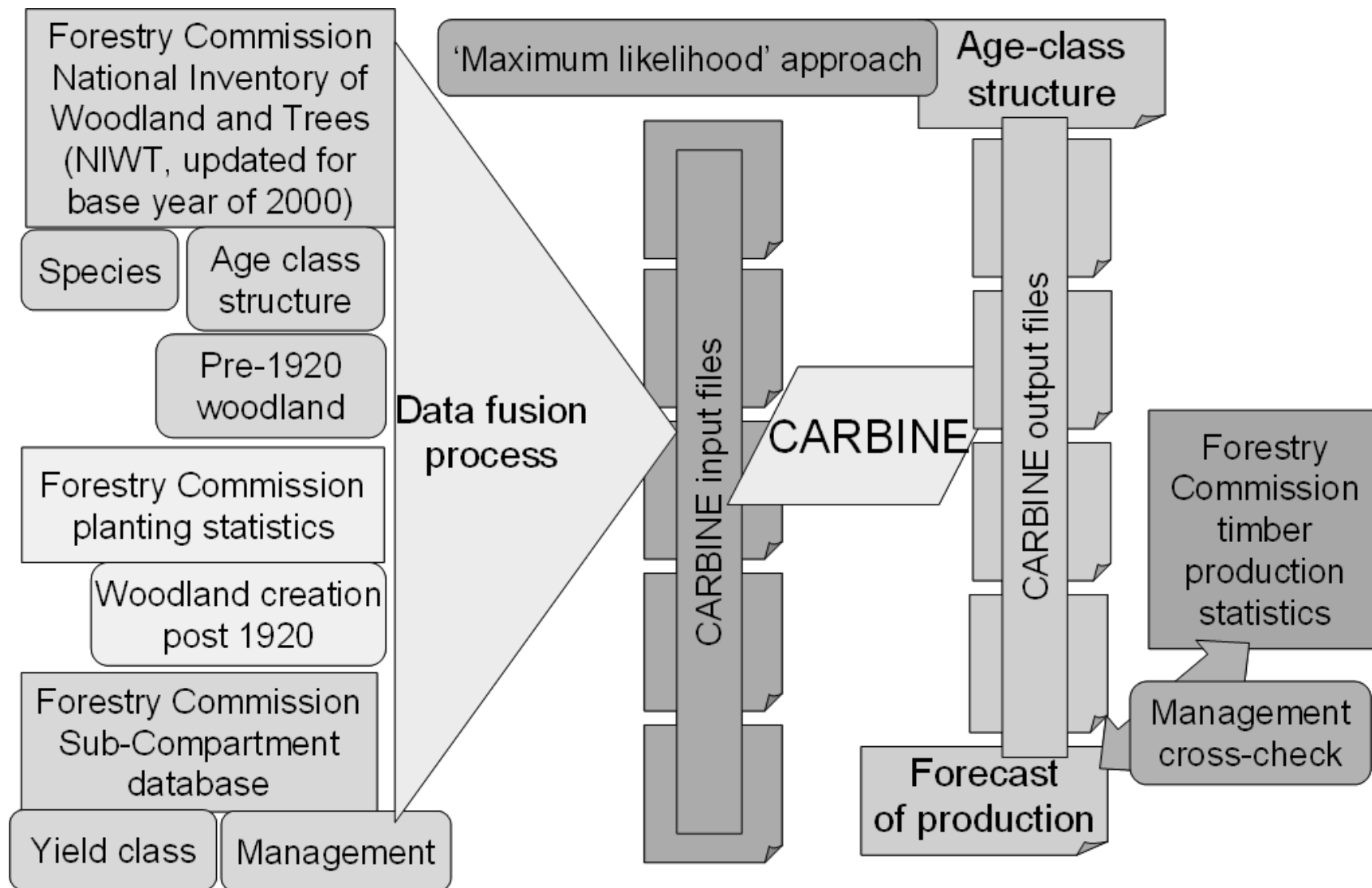


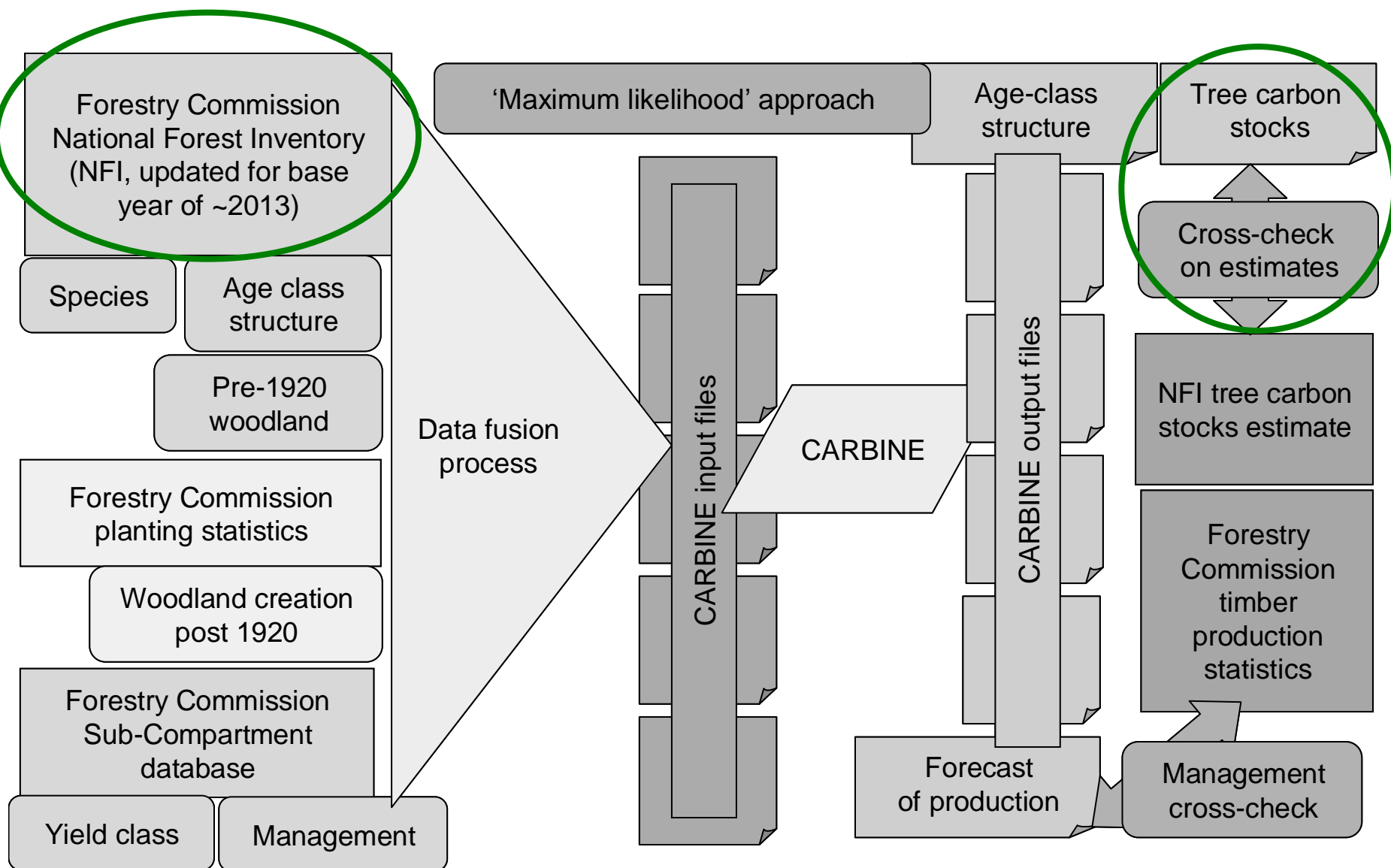
- Extend to England, Scotland, Northern Ireland
- Improve representation of forest soils and modelling of soil carbon
- Include greater range of possible management prescriptions (dynamic model)
- Improve modelling of disturbance events (but what about data requirements?)
- Reconcile with new National Forest Inventory ...

- England, Wales, Scotland woodland maps published
- Some deforestation area 'estimates'
- Estimates of standing volume also published (provisional for broadleaves)
- Yield class and growing stock assessments for private sector woodlands (statistical sample)
- 25-year forecast of timber production published
- Other publications in the pipeline including biomass and carbon in standing trees (carbon projections also possible)
- Soil carbon not covered
- (First) 'Cycle' of NFI assessments ongoing – complete by 2014.



- Need to think very seriously about how developments in NFI and associated projections can 'converge' with forest GHG inventory
- Coordinated and consistent approach required for estimating and reporting deforestation and afforestation (remote sensing methods)
- For the foreseeable future, forest carbon/GHG estimation/projection will need to be carried out as a separate exercise (e.g. for back-casting to 1990 base year, soil carbon)
- Latest NFI results need to be applied in place of 1990s NFI
- FC-forecast carbon projections 'could' provide another (key) 'reality check' on inventory estimates and projections.





**Thank you**