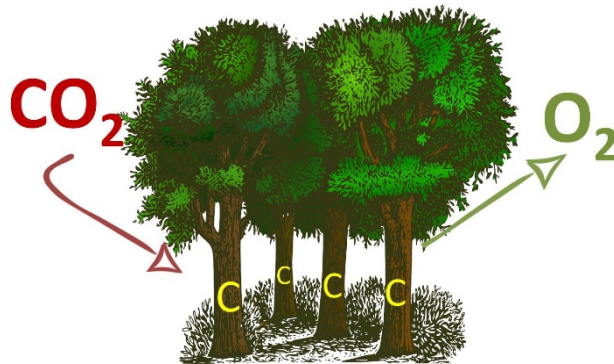


GHG Emissions: Positive Role of Forestry



Tom Houlihan
Teagasc Forestry Specialist
December 2, 2019

23,000 private owners
394,000 ha, 83% farmers

Ireland's forests and Forestry Programme supporting...

Forestry sector worth €2.3 billion



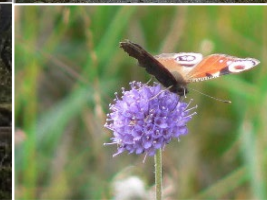
12,000 jobs (mainly rural)

Ecosystem services



778,000 ha
11% of land area

An Roinn Talmhaíochta,
Bia agus Mara
Department of Agriculture
Food and the Marine



Grant and Premium Categories (GPCs)

GPC 3:

15% Diverse Conifer/Broadleaf



GPC 4: Diverse Conifer



GPC 6: Pure Oak



GPC 8: Pure Alder/Birch



Native Woodland (GPC 9/10)

- Integral to Irelands natural heritage, history and culture
- Unique in terms of biodiversity
- Numerous ecosystem services

- **Native Woodland Establishment**
 - Grant Aid €5,880 - €6,220/ha
 - Annual premium **€665 - 680/ha (15 years)**

- **Native Woodland Conservation Scheme**
 - Grant aid: €2,500 (emergent), €5,000/ha high forest
 - Annual premium **€350/ha (7 years)**



Agro-Forestry (GPC 11)

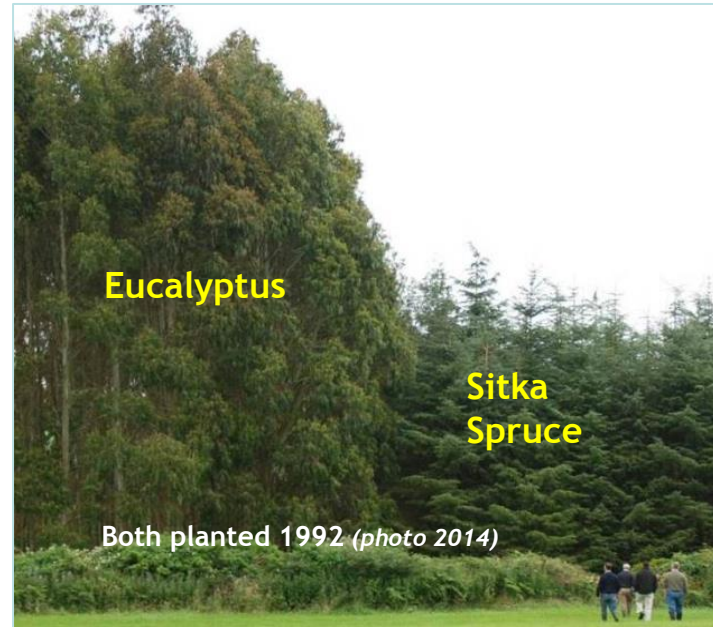
Silvo-pastoral: forestry and pasture

- **Oak, sycamore, cherry**
 - Continued access to land
 - Reduced fertiliser/chemical inputs
 - Animal welfare
 - Quality timber
 - Biodiversity
 - Water quality
 - Landscape quality
 - Improved drainage/shelter
 - Carbon sequestration
- **Premium €645-€660/ha for 5 years**



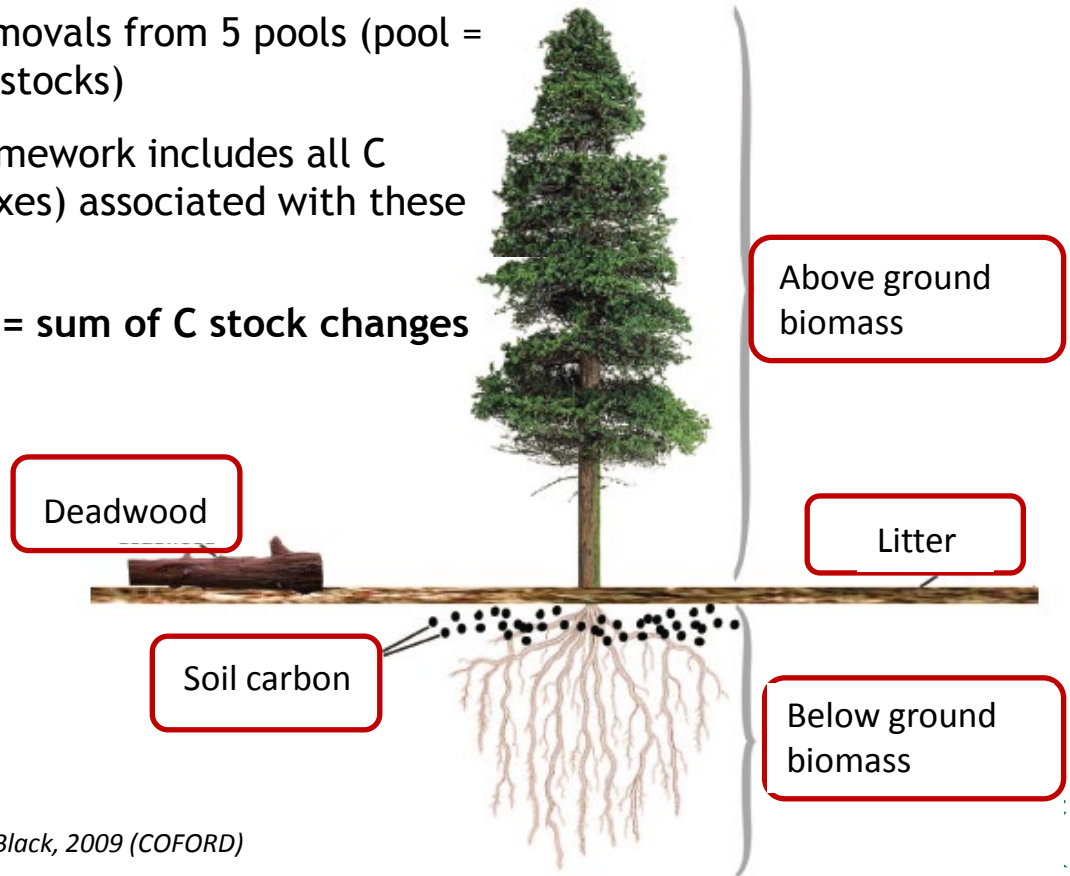
Forestry for Fibre (GPC 12)

- Growing productive trees to produce biomass in 10-15 years
- Eligible species
 - Italian Alder, hybrid aspen
 - Eucalyptus, poplar
- Grant €3,815 /ha
- 15 year premium: **€510-€520 /ha**



Forest Carbon (C) Pools

- Forest C balances based on net emissions/removals from 5 pools (pool = location of C stocks)
- Modelling framework includes all C transfers (fluxes) associated with these pools
- **Final output = sum of C stock changes**



Multiple Carbon Effect

1. C - Sequestration in growing forest (also land substitution effect)



2. C - Storage in harvested wood products

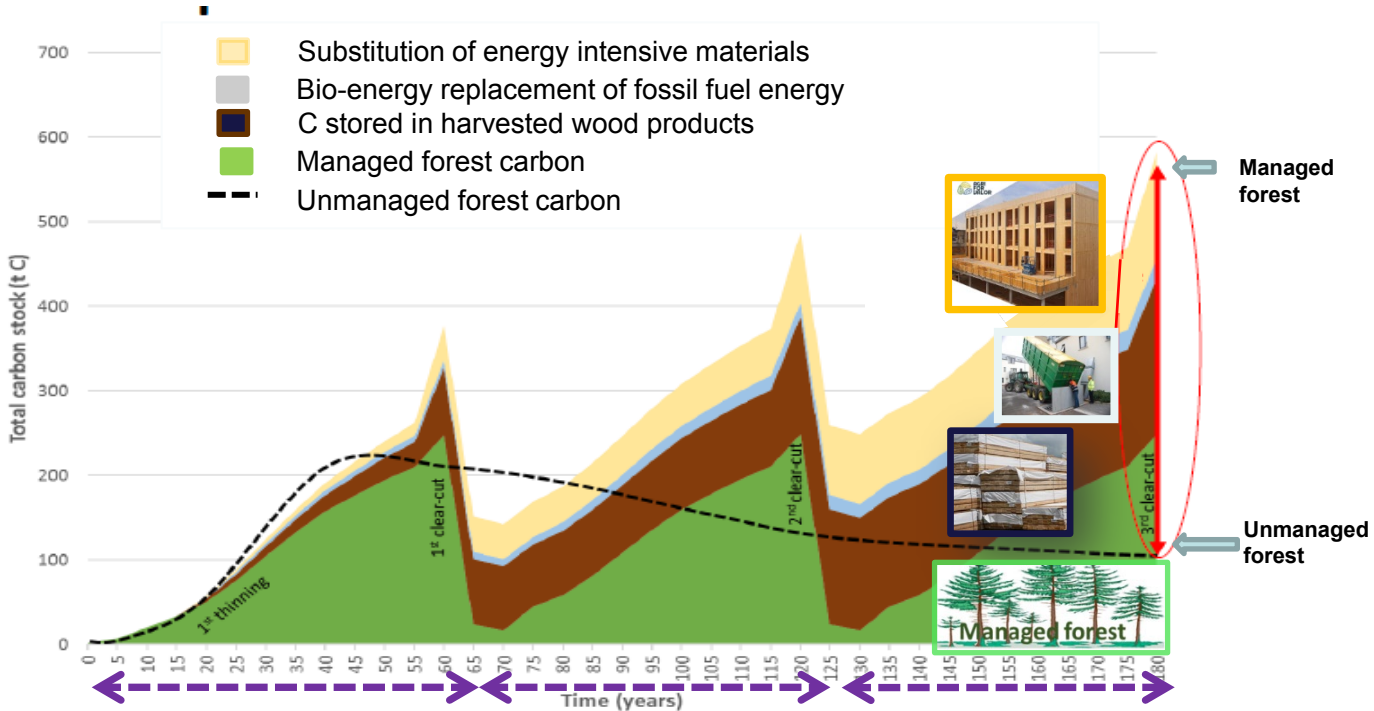


Substitution of energy intensive materials (not in accounting)

3. Substitution of fossil fuels with wood energy



Stand Level Processes



Adapted from Perez-Garcia et al., 2005

Estimating Carbon

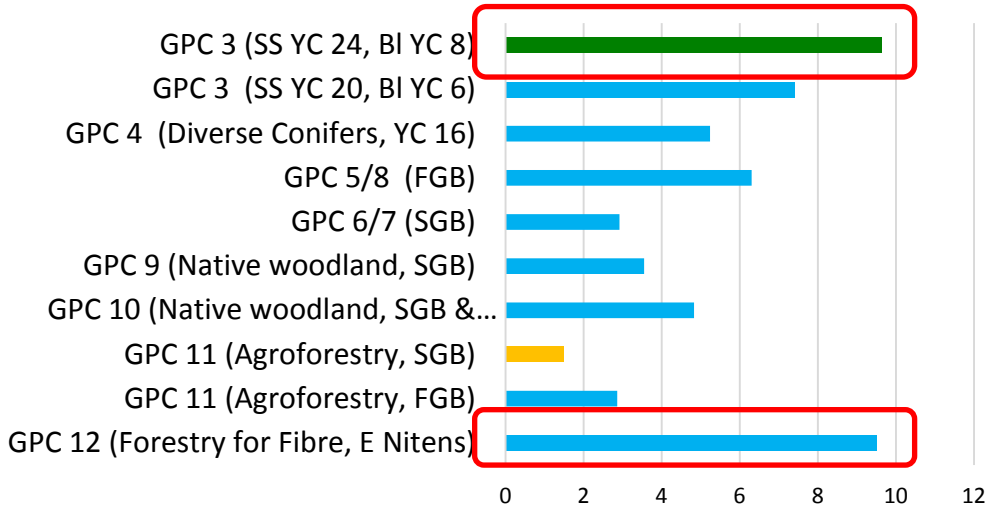
Remember: 1 tonne of C ~ 3.67 t CO₂ equivalent

- **Total Carbon Stock in Irish forests 312 million tonnes** (246.6 m in soil, 55.9 m in living trees, 7.1 m in litter, 2.1 m in litter)
- **On average, 4.3 tonnes approx. of CO₂-e /ha/year are sequestered by the total national estate** (by different tree species, on varying soil types, at varying ages and with different levels of harvesting) (NIR, 2019; DAFM 2019)
 - Estimated sequestration includes removals and emissions from biomass, litter, deadwood soils and harvested wood products.

Indicative Sequestration Rates

Indicative C-Sequestration Rates* for Grant and Premium Categories (GPCs)

tCO₂/ha/year



Key:

GPC – relevant forestry grant and premium category

YC –Yield class

SS –Sitka spruce

BI - Broadleaf element

FGB - Fast growing broadleaves e.g. alder.

SGB – Slower growing broadleaves e.g. Oak

E Nitens – *Eucalyptus nitens*

***Potential** sequestration rates normalised over 2 rotations

Note: Values represented **are indicative only** and involve a **range of assumptions**

Native Woodlands Average CO₂ /ha/yr

sequestered over a 100-year period

Woodland Type Scenarios	Dominant Species	Management	Average CO ₂ potential sequestration / ha / yr [#]
NWS 1 and 2	Oak	Biodiversity no thin	3.74
NWS 3 and 4	Oak	Biodiversity no thin	4.94
NWS 5 [#]	Birch	Biodiversity no thin	2.74
NWS 1 and 2 YC4 [*]	Oak	Timber production MTI	1.77
NWS 1 and 2 YC 6 [*]	Oak	Timber production MTI	2.42
Native woodland under UK WCC	Oak, hazel, birch	Biodiversity No thin	4.14

includes emissions from harvest and organic soils

* Includes HWP removals and emissions



Note: Figures presented are indicative and subject to caveats



AGRICULTURE AND FOOD DEVELOPMENT AUTHORITY

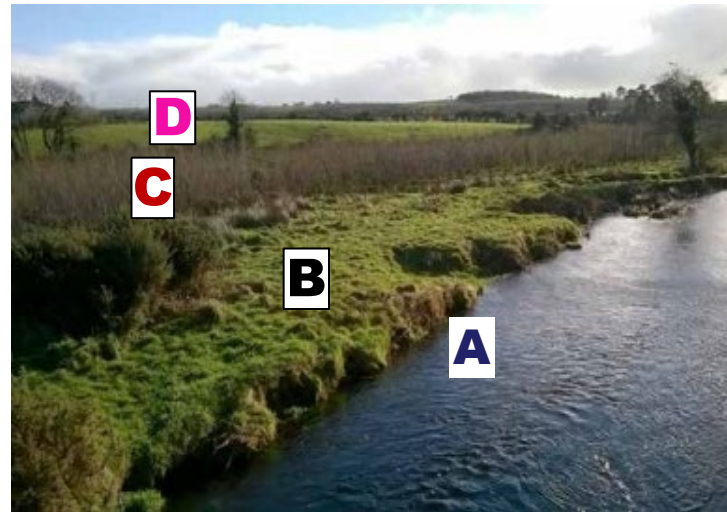
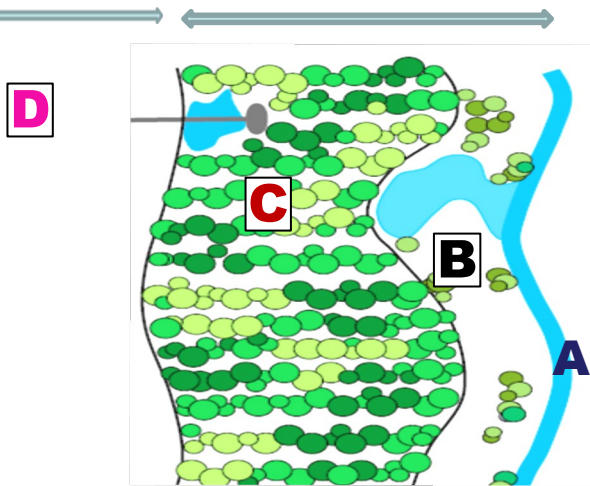
Woodland for Water

Combining undisturbed water setbacks and new native woodland

Adjoining land use:

- agriculture
- forestry
- built environment

Woodland for
water measure

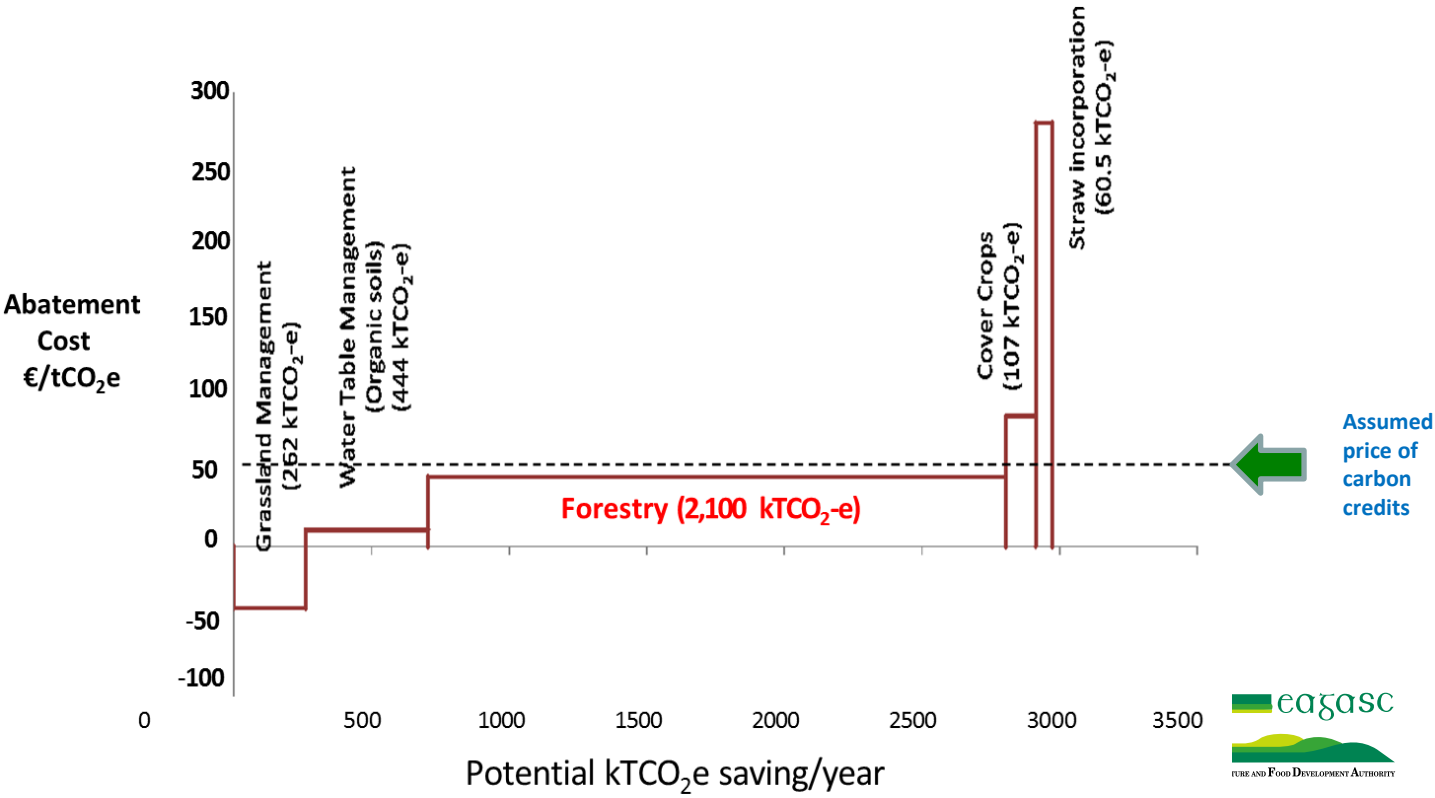


Effort Sharing Regulations

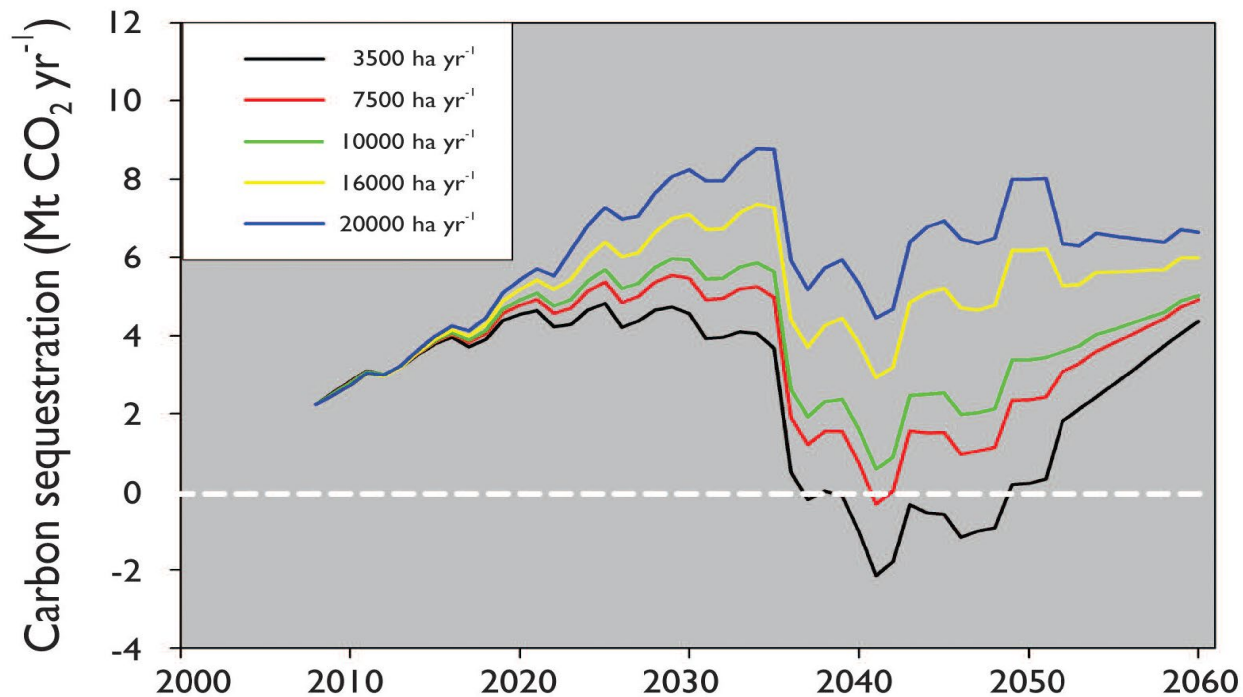
- *EU Member States must account emissions and removals of greenhouse gases from the land-use, land use change and forestry sector during the 2021 to 2030 period.*
- *Flexibilities (higher than other EU member states) including 5.6% of 2005 base year emissions*
 - *2.68 Million t (CO₂-e) LULUCF credits per annum*
- *Projected that this can be met and exceeded with bulk of sequestration from forestry*
- *In order to reach future post-2030 targets greater flexibilities will be required in terms of utilising carbon sinks in order to approach C neutrality.*

Mitigation Pathway

Land use, Land use change & Forestry



Projected sequestration of carbon dioxide by Kyoto forests, based on afforestation rate



Source: COFORD Connects, (2010)

National Hedgerow and Trees Outside the Forest

Irish Hedge Map – Version 1.0 (Teagasc 2011)

- Based on 2005 ortho-photography
- Digital mapping of all mature hedgerows, individual trees and non forest woodland and scrub
- National cover estimate: **482,000 ha** (80% accuracy)
 - Cork 57000 ha, Tipperary 35,000, Galway 30,000 ha, Limerick 25,000 ha, Meath 24,000, Kerry/Mayo 23,000 ha each

Third National Forest Inventory (DAFM 2017)

- National hedgerow and non-forest other wooded land
- Estimated at **347,000 ha or 4.9% cover**
 - Different methodologies
 - Variation in classification of non-forest woodland and scrub/forest

New Hedgerows

Scheme	Newly established hedgerows (km)	Newly planted trees	Newly planted orchard trees
Rural Environment Protection Scheme (REPS) 1994 - 2010	4,100	1,702,972	N/A
Agri-Environment Options Scheme (AEOS) 2010 - 2014	1,322	464,910	N/A
Green Low Carbon Agri-Environment (GLAS) 2014 - 2018	1,183	1,617,516	11,182
Total	6,605	3,785,398	11,182

Source: Forest Statistics Ireland 2019, DAFM

Hedgerows

EPA 2014, *Carbon Sequestration by Hedgerows in the Irish Landscape*, Climate Change Research Programme

- Hedgerow and non forest woodland and scrub – potential to sequester 0.66 -3.3 tonnes of CO₂/ha/year
- Based on existing national cover estimates, could result in a net removal of 0.27-1.4 MT CO₂/year
- Estimate of 0.1- 0.5 MT CO₂/year (DCCA, 2019)
- **Accounting also need to be considered (e.g. additionality, effects of management)**
- Study to quantify climate mitigation potential in 2021.



Conclusion

Farm Forestry is a very significant ally in the quest for agricultural sustainability

- Farm viability, climate mitigation, water quality and biodiversity, local development

Key drivers:

- Whole farm planning
- Well sited and planned farm forests
- Using appropriate species & planting categories to promote sustainable growth
- Ongoing sustainably management of exiting forests
- Opportunities for multiple use and added value