Forest Products Carbon Protocols

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Forest Products

- The C in trees that is retained in wood products has gained some acceptance as an important long-term storage pool
- This is a major value for carbon sequestration in Georgia
- Southern forest produce
  - ~18% of the world's industrial roundwood
  - 14% of lumber
  - 25% of wood pulp

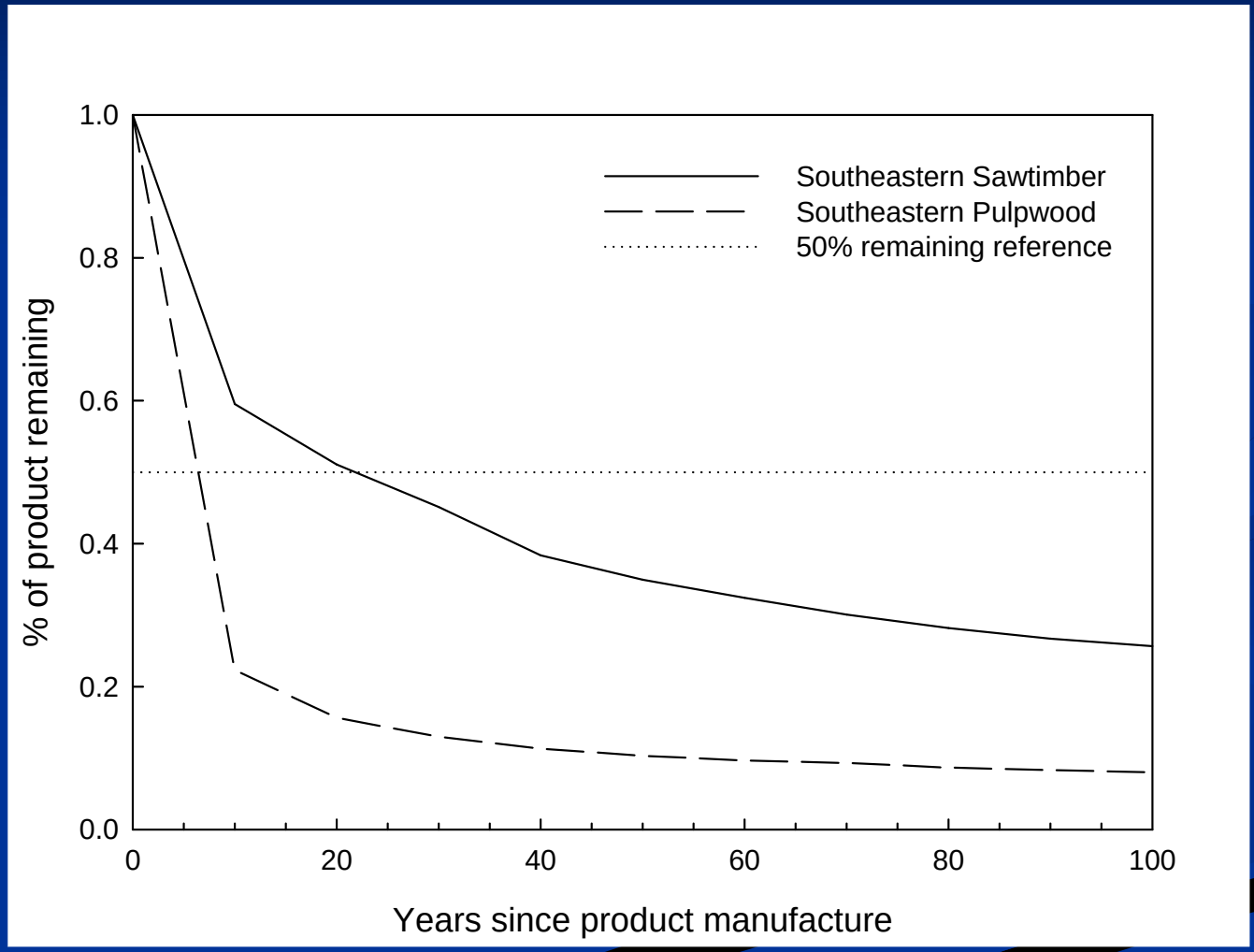
Forest Products

- These products have a variety of end-uses
  - Construction (long life)
  - Furniture (medium life)
  - Paper (short life but high recycling rates)
- Eventually this wood-in-use as products will be disposed of through various mechanisms
  - Landfills (although decay rates in landfills maybe long)
  - Burning
  - Natural Decomposition

Forest Products

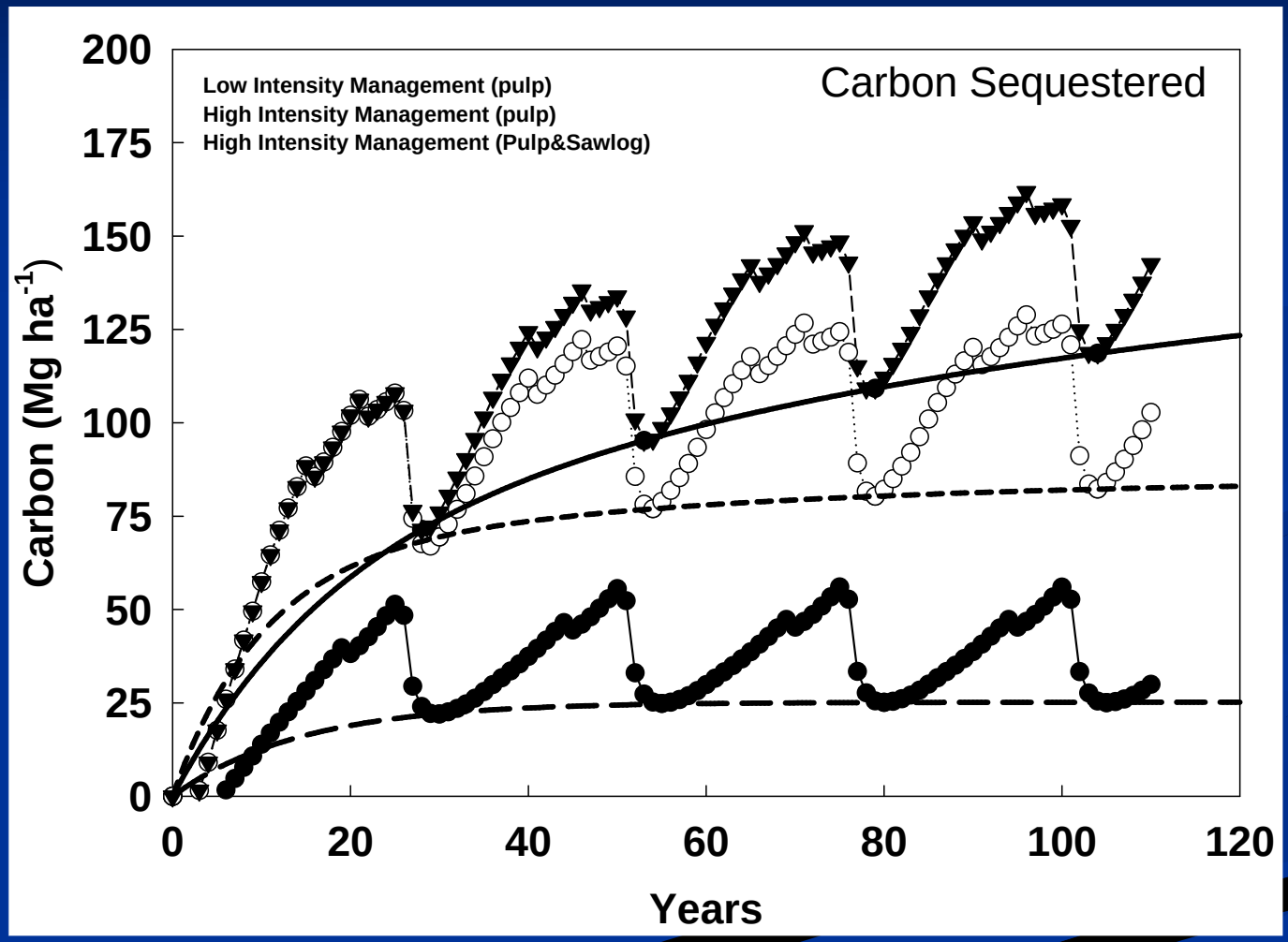
- The life cycle of wood use whether as pulp for paper or dimensional lumber for construction will clearly affect the time between tree harvest and C return to the atmosphere

Estimated loss of wood-in-use



Birdsey

Estimate C sequestration due to differential product outputs and decay rates



Markewitz

Carbon in Forest Products

- Allocation of carbon from trees to end use products and carbon disposition over time
  - Primary wood products approach
    - Allocates carbon stored in products to various end used
    - Requires estimation of C in each product
    - Requires disposition tables (accounts for recycling)
    - Products include
      - Softwood and hardwood lumber
      - Softwood plywood
      - Oriented strand board
      - Non-structural panels
      - Miscellaneous products
      - Paper
    - Appropriate for manufacturers
      - Requires firms document volume of production
      - To claim credits firms would have to acquire carbon rights and follow chain of custody

Primary Wood Products to C conversion factors

Product	Unit	tons (2000 lbs) C	tonnes C
Sofwood lumber/lamminated veneer lumber/ glulam lumber/I-loists	MBF	0.488	0.443
Hardwood lumber	MBF	0.844	0.765
Softwood lumber	1000 ft^2: $^3/_8$“ basis	0.260	0.236
OSB	1000 ft^2: $^3/_8$“ basis	0.303	0.275
Non-structural panels	1000 ft^2: $^3/_8$“ basis	0.319	0.289
Hrdwd veneer/plywood	1000 ft^2: $^3/_8$“ basis	0.315	0.286
Particleboard/medium density fiberboard	1000 ft^2: $^3/_4$“ basis	0.647	0.587
Hardboard	1000 ft^2: $^1/_8$“ basis	0.152	0.138
Insulation board	1000 ft^2: $^1/_2$“ basis	0.242	0.220
Other	1000 ft^3	8.250	7.484
Paper	Air dry tons (2000 lbs)	0.450	0.496

Primary Wood Products in-Use Disposition

Year after production	Softwood lumber	Hardwood lumber	Softwood Plywood	OSB	Non-Structural Panels	Misc	Paper
0	1	1	1	1	1	1	1
1	0.973	0.938	0.976	0.983	0.969	0.944	0.845
5	0.875	0.741	0.888	0.922	0.857	0.749	0.430
15	0.698	0.456	0.724	0.799	0.647	0.420	0.040
45	0.429	0.183	0.455	0.568	0.330	0.074	0
90	0.258	0.075	0.271	0.379	0.159	0.006	0

Primary Wood Products Landfill Disposition

Year after production	Softwood lumber	Hardwood lumber	Softwood Plywood	OSB	Non-Structural Panels	Misc	Paper
0	0	0	0	0	0	0	0
1	0.018	0.041	0.016	0.011	0.021	0.037	0.051
5	0.081	0.168	0.073	0.050	0.093	0.163	0.178
15	0.187	0.334	0.171	0.124	0.218	0.357	0.253
45	0.320	0.452	0.307	0.244	0.376	0.513	0.176
90	0.395	0.486	0.388	0.333	0.446	0.519	0.152

Forest Products

- Industrial roundwood harvest approach
  - Assess the actual volume of roundwood harvested
    - Excludes bark and fuelwood
  - Once mass of carbon in roundwood is known, C disposition schedules are used to assess storage of C in wood products
  - Includes softwood and hardwood sawlogs and pulpwood
  - Disposition schedules are for products in use, disposed in landfills, used for energy and emitted without energy capture
  - Appropriate for use by sellers or wood buyers
    - Could retain their carbon rights
    - Would have to document industrial roundwood removal by product and species

Industrial Roundwood Forest Products C Disposition

Carbon Disposition, Softwood sawlog, 0-100 years

Age	In use	Landfill	Energy	Emitted
1	0.601	0.017	0.270	0.112
5	0.493	0.068	0.303	0.136
10	0.402	0.110	0.331	0.157
15	0.345	0.136	0.347	0.172
20	0.306	0.153	0.357	0.184
25	0.276	0.166	0.364	0.194
30	0.251	0.176	0.370	0.203

Forest Products

- Forest Stand Approach
  - Estimate the mass of C that would be stored in wood products if stand was harvested
  - Aboveground merchantable C estimates can be used to provide the distribution of C by product
  - From there, industrial roundwood harvest estimates by product can be developed
  - C storage in wood products could not be registered until the actual harvest

Forest Products

- Carbon registration of products has remained a difficult issue due to ownership and chain-of-custody concerns
- Regardless, products have an important place in the registry
- Contact Dr. Siry with questions (jsiry@warnell.uga.edu)