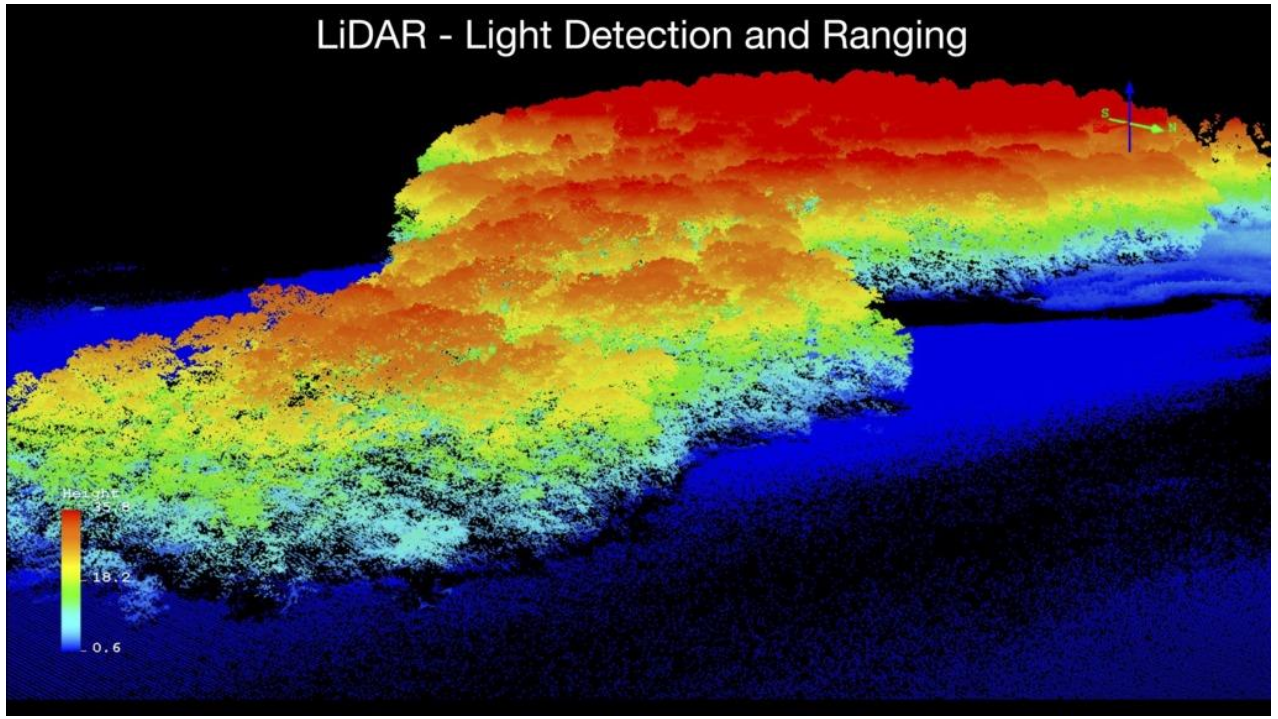
Utilizing Natural and Working Lands to Combat Climate Change

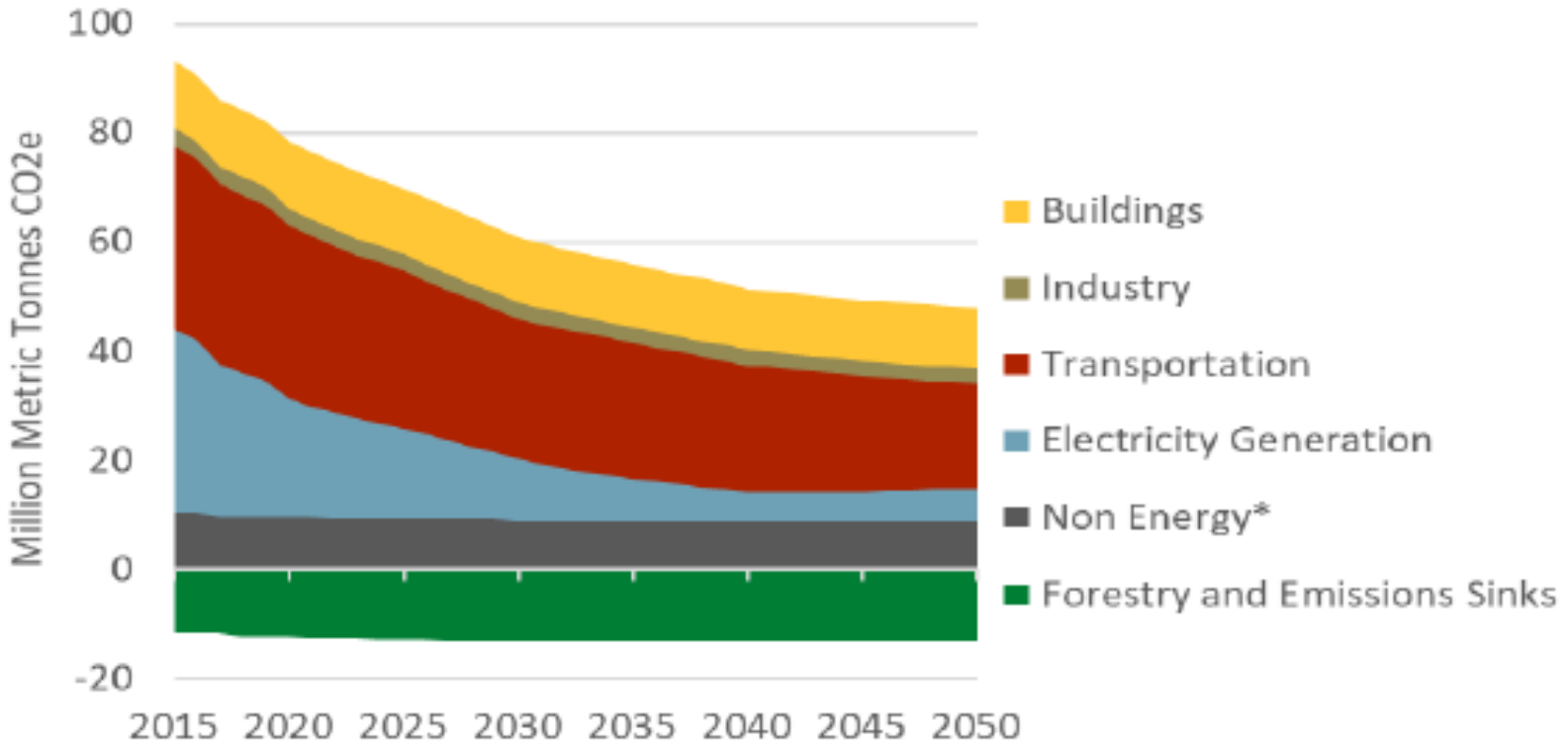


Maryland Commission on Climate Change Mitigation WorkGroup
6.23.20

Elliott Campbell, PhD
Director, Center for Economic and Social Science
Maryland Dept. of Natural Resources

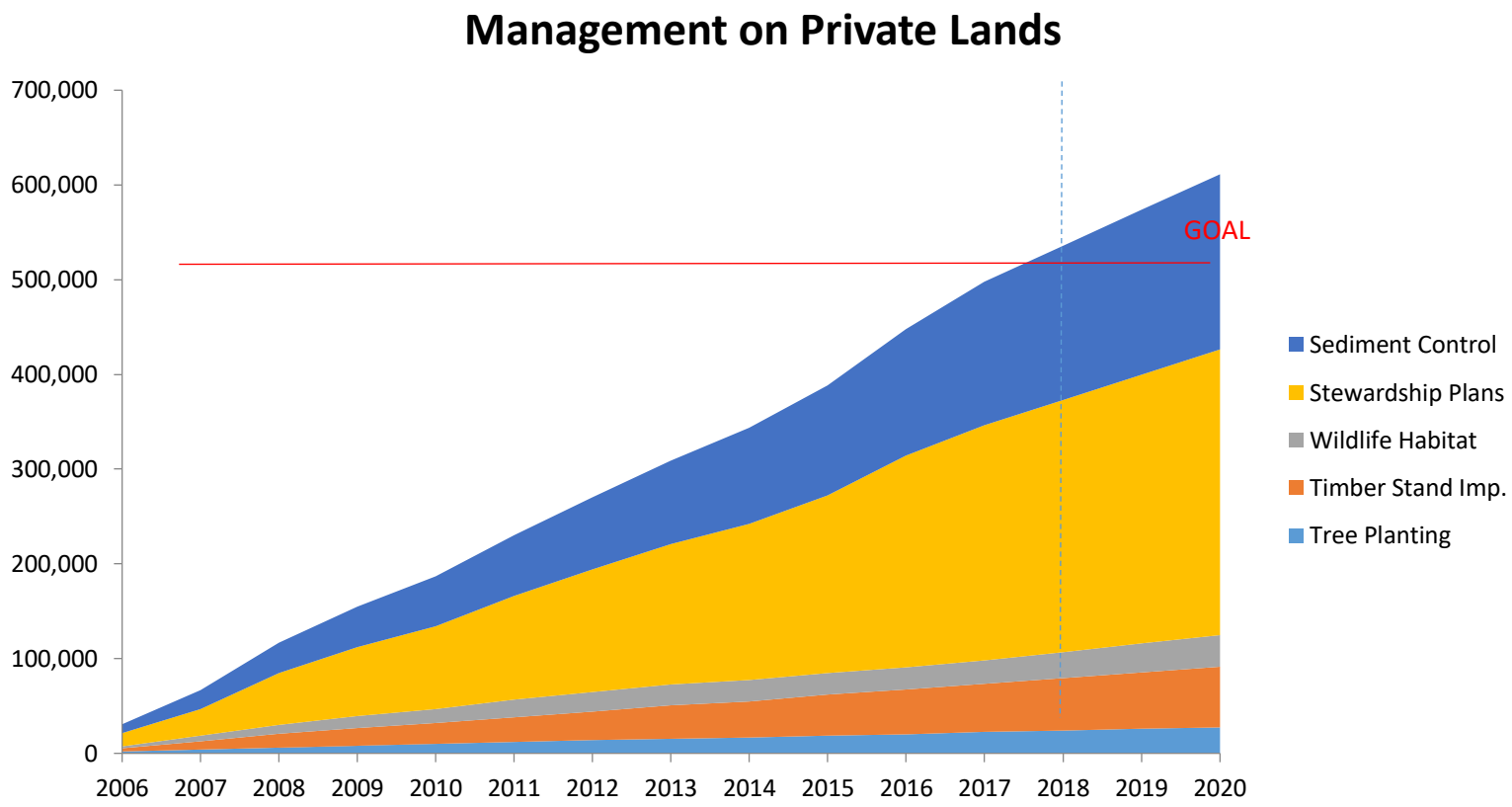
Image Source: Hurtt et al. 2016

Maryland GHG Projections from Draft Plan

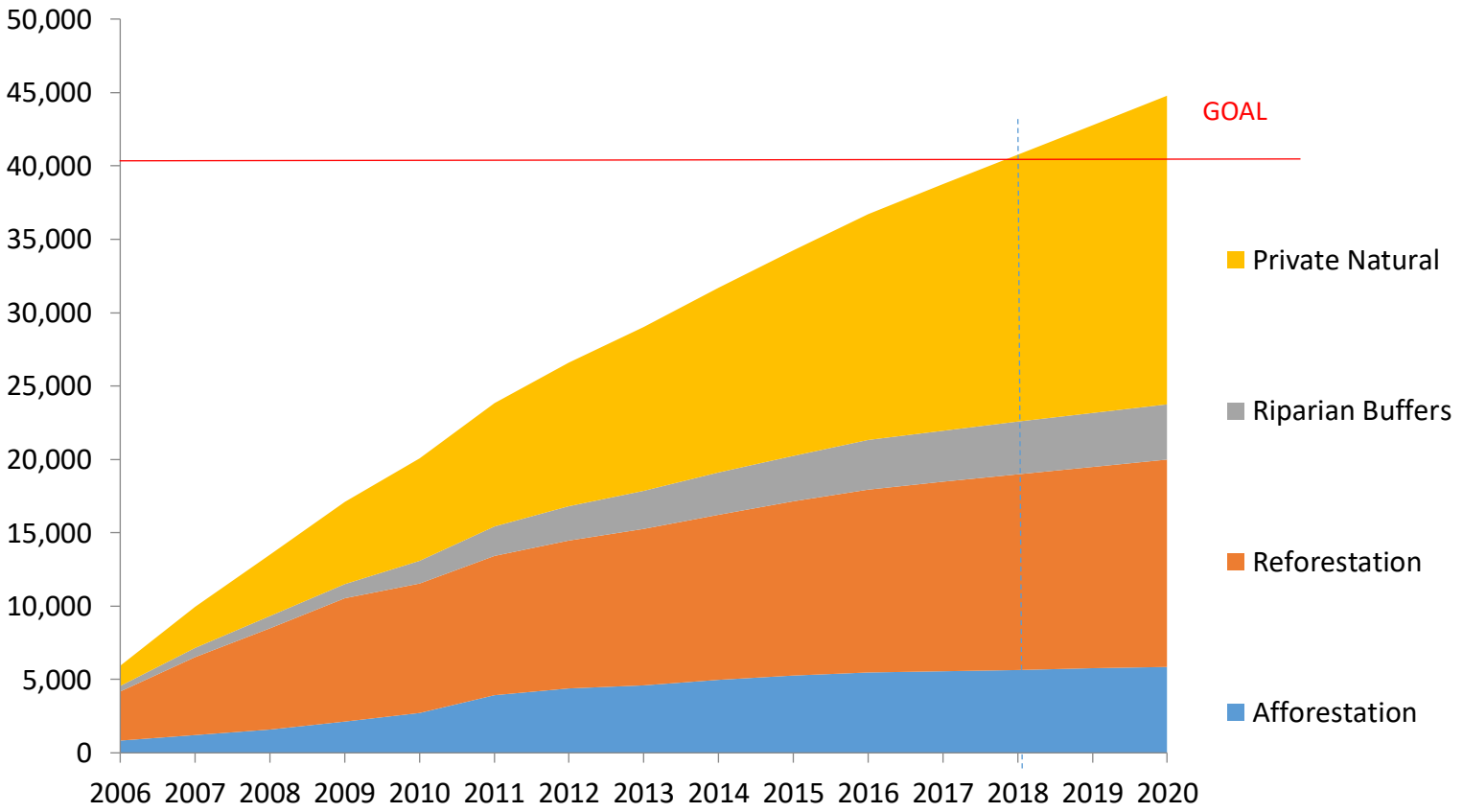


Managing Forests to Capture Carbon

- Public lands: acreage certified under FSC and SFI (211,000 acres, have exceeded goal of 50% of state owned forest land)



Planting Forests in Maryland



MD DNR 2030 GGRA Plan Projections

	Avg. Annual 2020-2030 Low	Avg. Annual 2020-2030 Medium	Avg. Annual 2020-2030 High	Avg. Annual 2020-2030 DNR Target		2030 Low (MMT CO2e)	2030 Medium	2030 High	2030 DNR Target
Forest Management, public lands	1,500	2,000	3,000	1,600	acres per year	0.02	0.020	0.021	0.020
Forest Management, private lands	35,000	50,000	60,000	38,000	acres per year	0.86	1.04	1.16	0.92
Planting Forests	2,000	3,000	4,000	2,550	acres per year	0.28	0.32	0.36	0.30
Urban Tree Canopy	150,000	350,000	500,000	265,000	trees planted per year	0.003	0.004	0.005	0.0035
Avoided Forest Conversion	500	800	1,300	800	acres per year	0.10	0.15	0.24	0.15
Total (MMT CO2e per year)						**1.26**	**1.53**	**1.78**	**1.39**

Forest Carbon Sink in Maryland

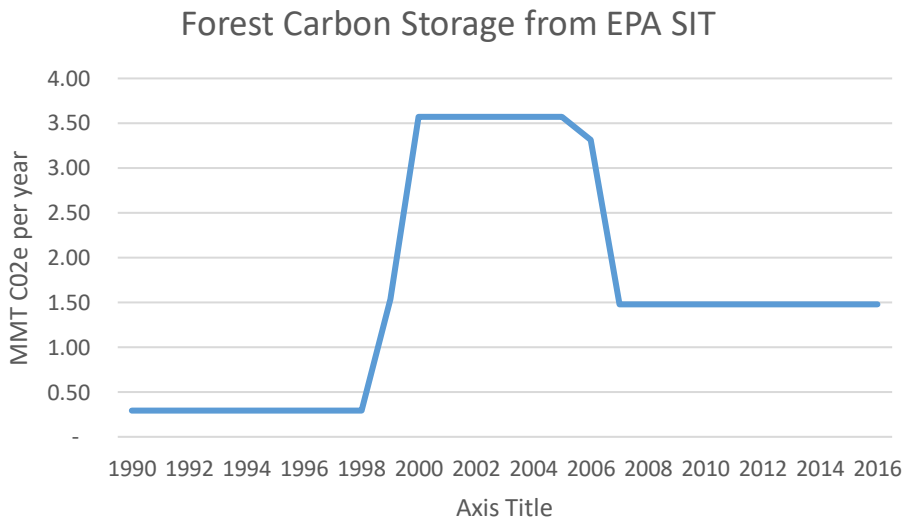
Largest carbon sink in Maryland but estimates vary widely

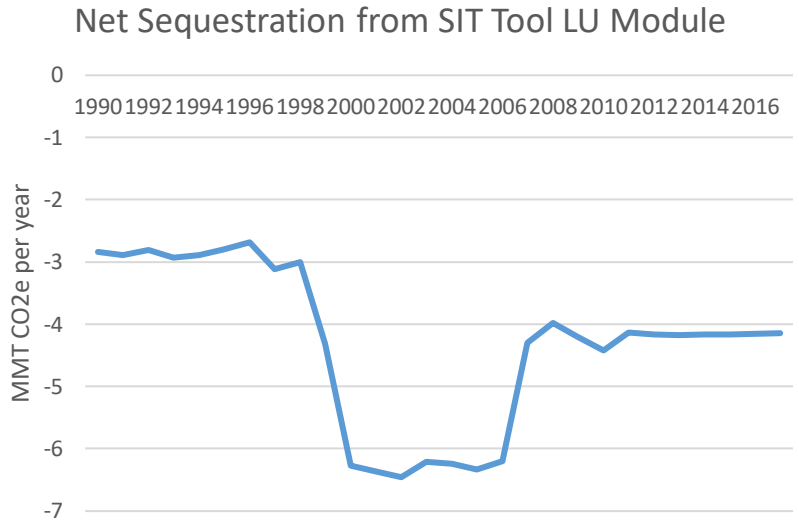
- Initial ~2009 estimate from EPA SIT tool used in our 2009 Greenhouse Gas Reduction Act
  - 11.72 million metric tons of CO2e per year from forests and urban trees

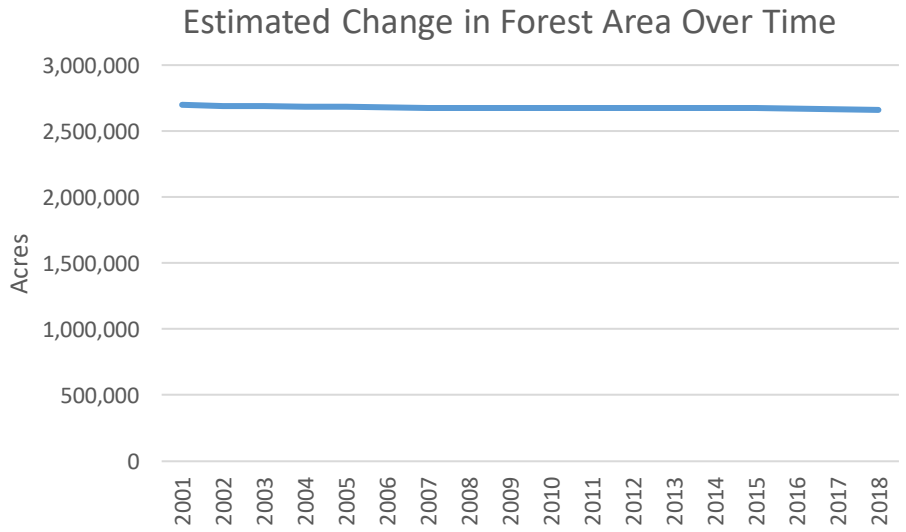
- Most recently available EPA SIT tool output using default values
  - 1.48 million metric tons of CO2e per year from forests
  - 1.67 MMT C02e from urban trees
  - Total 4.14 MMT CO2e including landfilled wood products, forest fires, ag. Soils, etc.

- Understandable that methodology changes over time, but variability in estimates doesn't seem to reflect on the ground trends in forest cover and forest harvest

Output of State Inventory Tool

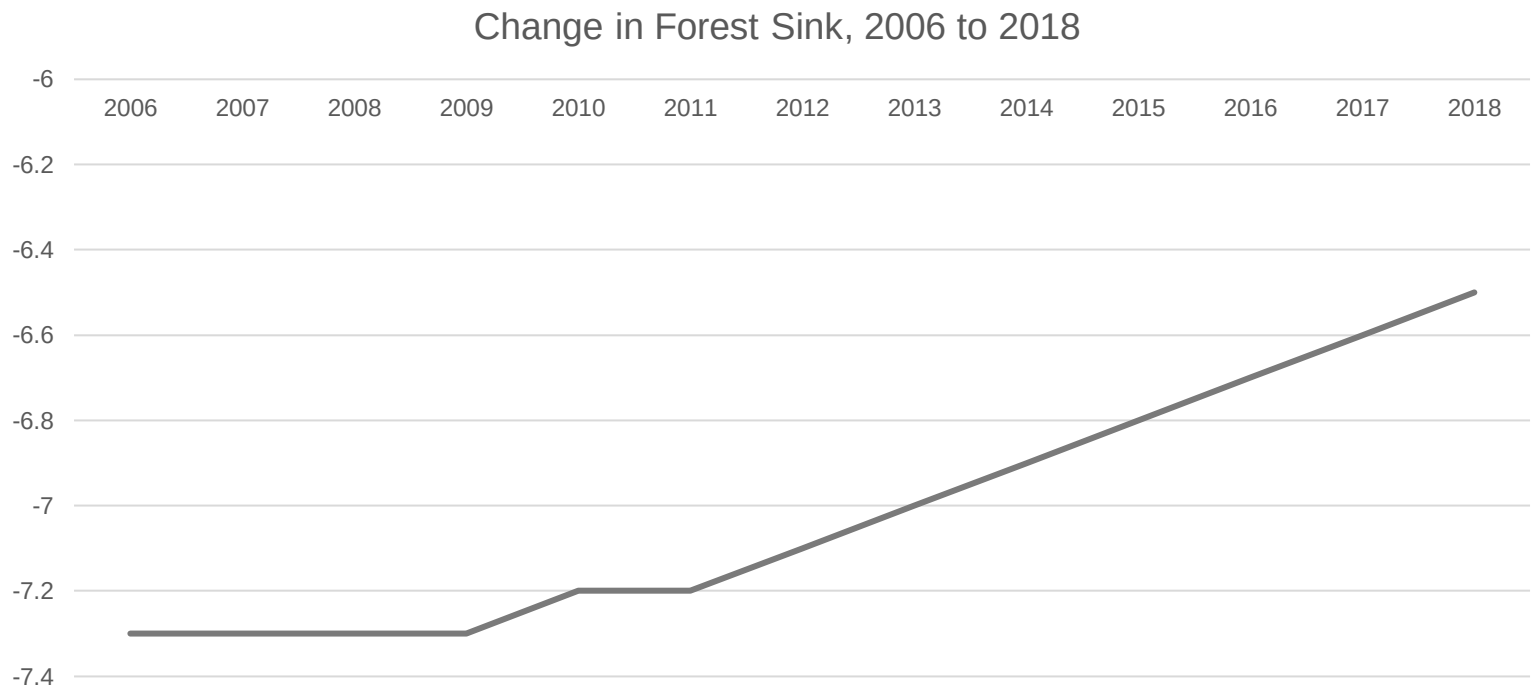






Forest Carbon Sink in Maryland- USFS

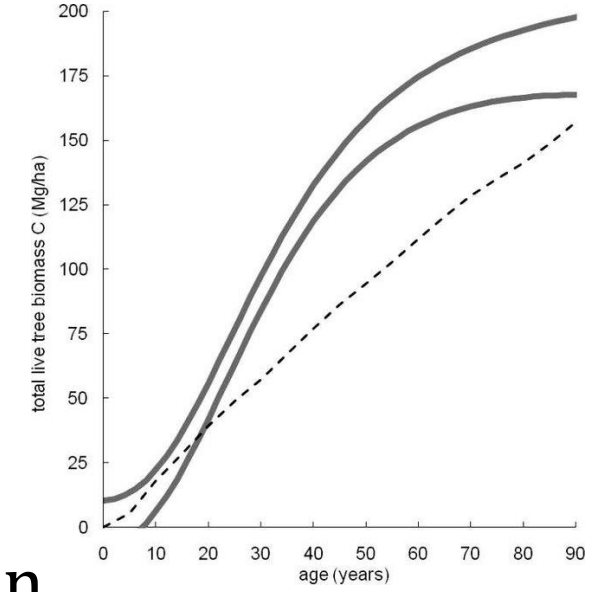
- ~7 million metric tons of CO2e every year
- 2020 USFS Forest Carbon Inventory improved over past inventories, now agrees with UMD NASA Carbon Monitoring System
- EPA SIT will use this inventory in 2020 update



Forest Carbon Sink in Maryland

Many reasons why carbon sequestration has decreased 17% from 2006-2018

- Loss of forest land (~1% loss over same time period)
- Invasive species (unknown impact)
- Pest and disease outbreaks (unknown impact)
- Deer herbivory (population slightly less than 2006)
- Changing Climate (impact unclear)



But…

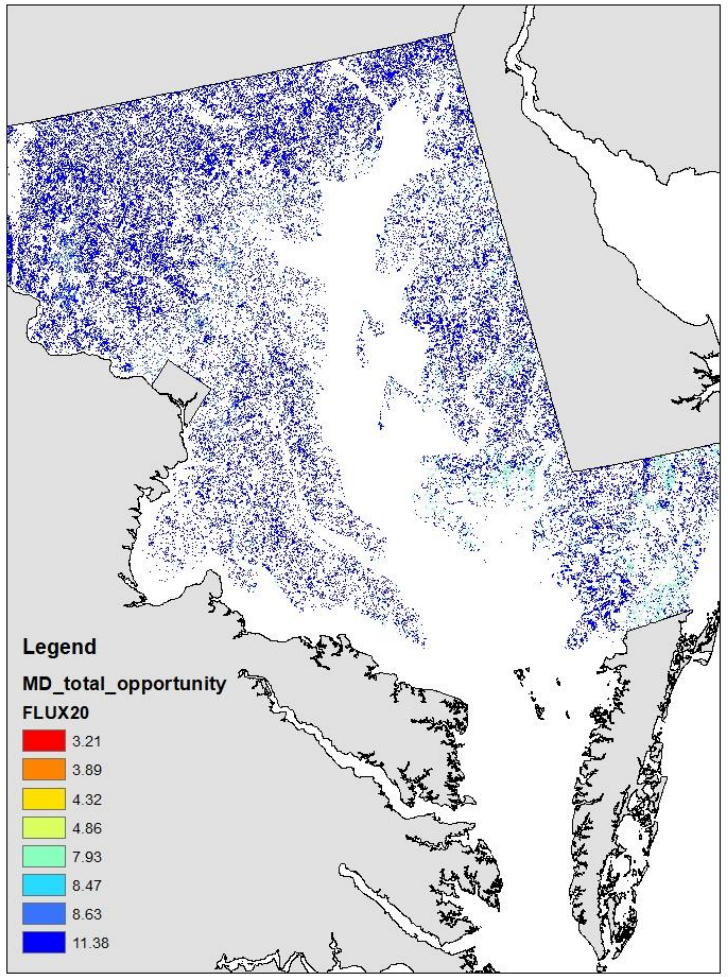
- According to the USFS the largest impact is an aging forest- 78% of forest “mature”
- This can be addressed through forest management!

Forest Product Markets- Vital Piece of the Puzzle

- Forest products provide the economic incentive for private landowners to conduct forest management
- Challenging environment for forestry in MD
  - Closure of mills (Luke and others)
  - Urbanization makes it less likely for forest management to occur
  - Regulatory barriers (or perception of barriers)
- DNR is conducting a economic adjustment strategy for Maryland forestry
- New biomass to energy facilities would provide an important market for pulpwood

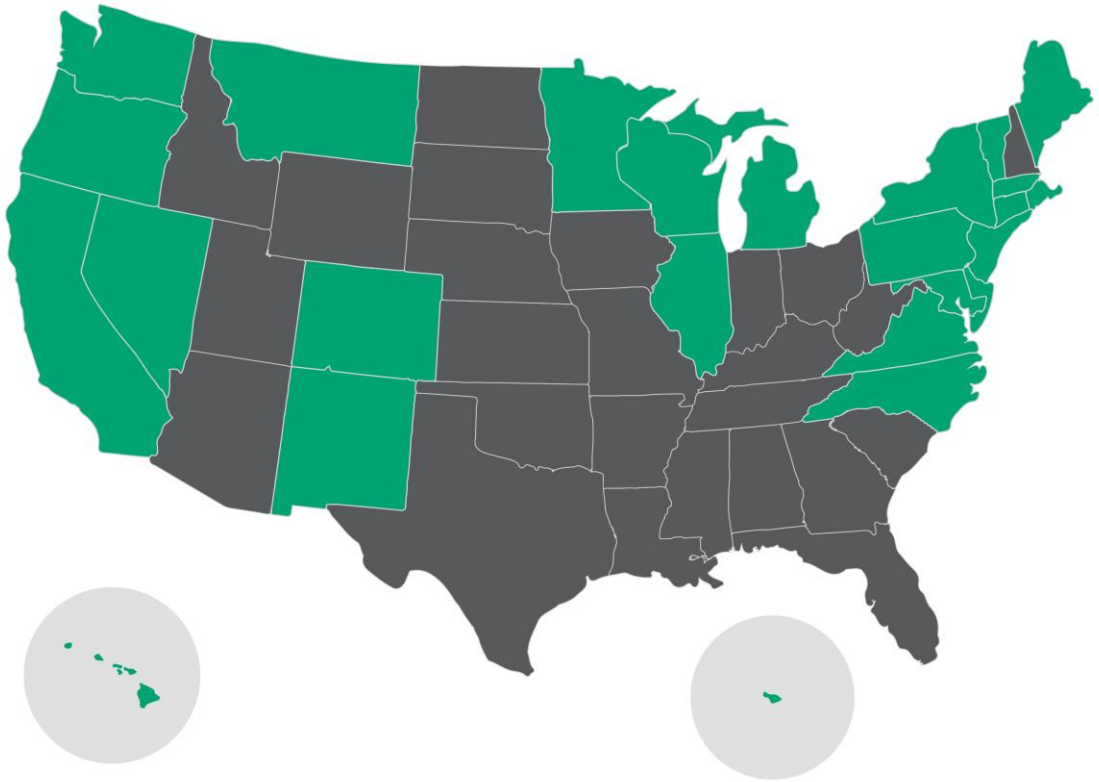
What is Possible? The Nature Conservancy Planting Opportunity Study

- Identified areas of unstocked forest, challenging pasture and croplands, other pasture lands, urban open space
- If all these lands were reforested (~1 million acres), would increase sink by 4.36 million metric tons CO2e per year
- 94% of the opportunities are on privately owned land
- ~1/2 opportunities on pasture land
- Silvipasture!



Opportunity for SCALE: US Climate Alliance

The U.S. Climate Alliance is a bipartisan coalition of 25 governors cooperating to tackle the climate challenge.



- Improve inventory methods
- Identify best practices for conservation and management
- Advance programs, policies, and incentives to reduce GHG emissions and enhance resilient carbon sequestration
- Integrate actions and pathways into state GHG mitigation plans

- Source: US Climate Alliance

Efforts to Improve Quantification of Natural and Working Lands Carbon Sinks

- Collaboration with UMD NASA Carbon Monitoring System research group
- MD participates in the Natural and Working Lands (NWL) partnership of the US Climate Alliance and has two forest carbon projects underway
  1) Analyze carbon and economic impact of forest management over time. Partners- PA DCNR, USFS, American Forests
  2) Annualize forest carbon inventories by combining NASA data products for carbon storage and sequestration potential with optical imagery of forest change. Project will generate uncertainty estimates and be used to annually update Maryland's forest portion of the GHG inventory- Partners UMD, WRI, and DE NREC

Blue Carbon

Carbon storage and sequestration in the estuarine or marine environment

- Coastal wetlands
- Submerged Aquatic Vegetation (sea grasses)

- Blue carbon is complicated
  - Highly variable rates of sequestration
  - Must account for changing rates of accretion and possible loss due to sea level rise/erosion
  - Must account for methane emissions

- Blue Carbon Initiative with UMCES, Restore America's Estuaries and COMPASS
  - Identify research needs
  - Highlight ongoing work
  - Clarify how blue carbon fits into Maryland GHG reduction plan

- USCA Blue Carbon Modelling Project
  - Led by Duke University
  - Partnership of MD, NC, VA, DE, NJ, NY
  - Models impact of wetland change out to 2120 on blue carbon in coastal wetlands
  - Preliminary results show a wide range of outcomes dependent on emissions scenarios

Opportunity for SCALE: Federal Legislation, Carbon Markets

- Trillion Trees
  - UN Initiative signed onto by the US
  - Legislation introduced in February that would set targets and provide support for reforestation and carbon sequestering harvested wood products
- Carbon Markets
  - Price was projected to increase significantly from airline commitments that would have doubled voluntary market, now unknown due to COVID
  - Historically Challenging in Maryland due to size of forest land holdings
  - Several efforts to allow smaller landowners to participate- TNC Family Forest program, Lyme Timber Company, Chesapeake Bay Program pilot program in VA.

Questions?

elliott.campbell@maryland.gov