Developing a carbon sequestration performance metric for evaluating USDA policies

Jeff Kline

USDA Forest Service
Pacific Northwest
Research Station

USDA United States Department of Agriculture

Co-authors

Robert G. Haight, USDA Forest Service
Randall Bluffstone, Portland State University
John W. Coulston, USDA Forest Service
David N. Wear, USDA Forest Service
Kate Zook, USDA Office of Chief Economist

Funding:

Council on Food, Agriculture and Resource Economics (C-FARE)

USDA United States Department of Agriculture

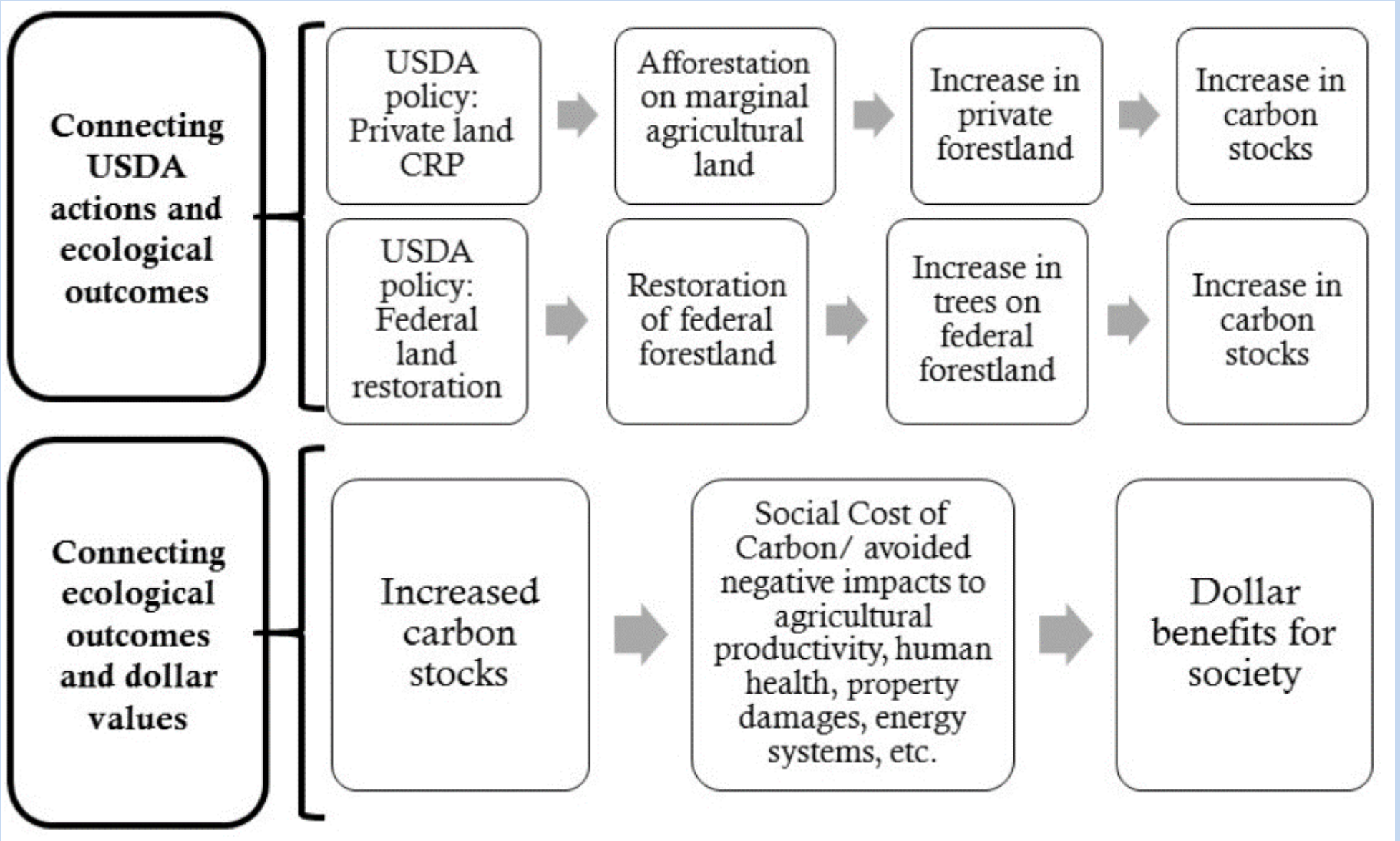
Background

"Address a need for reasonably feasible metrics about policy relevant ecosystem services, that USDA could reasonably implement."

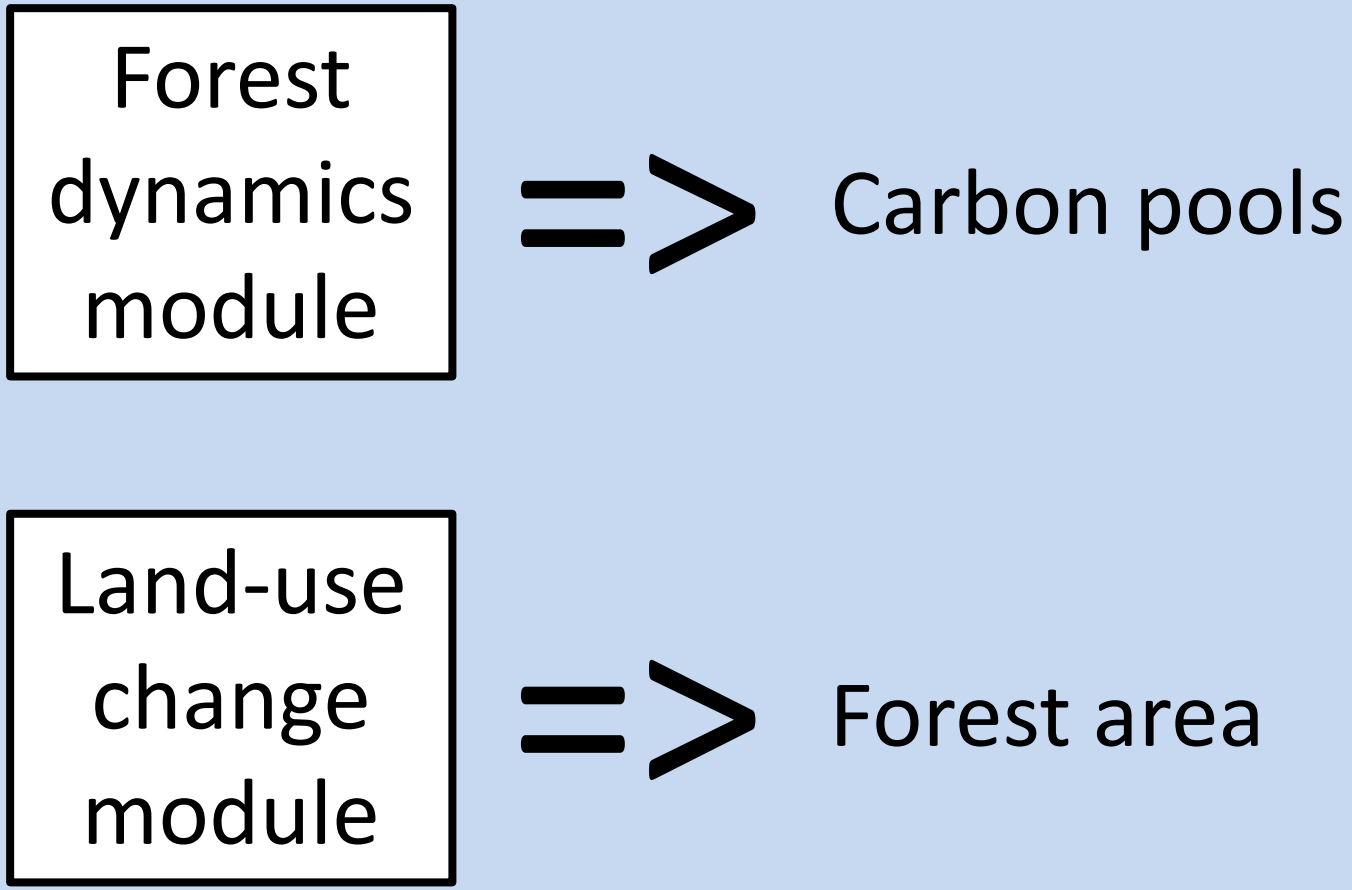
Objectives

1. Assemble science on the biophysical and socioeconomic impacts of USDA conservation programs affecting carbon;
2. Determine whether the science supports credible nonmonetary or monetary benefit estimates;
3. Demonstrate a feasible process for evaluating the monetary and nonmonetary beneficial impacts;
4. Characterize key uncertainties and caveats;

Connecting actions, outcomes, and dollar values

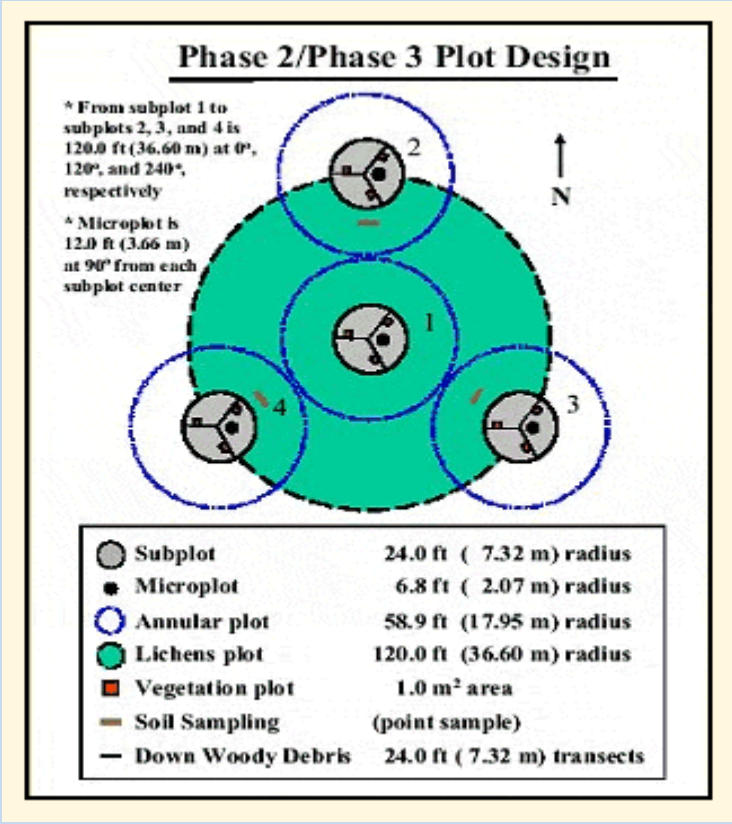


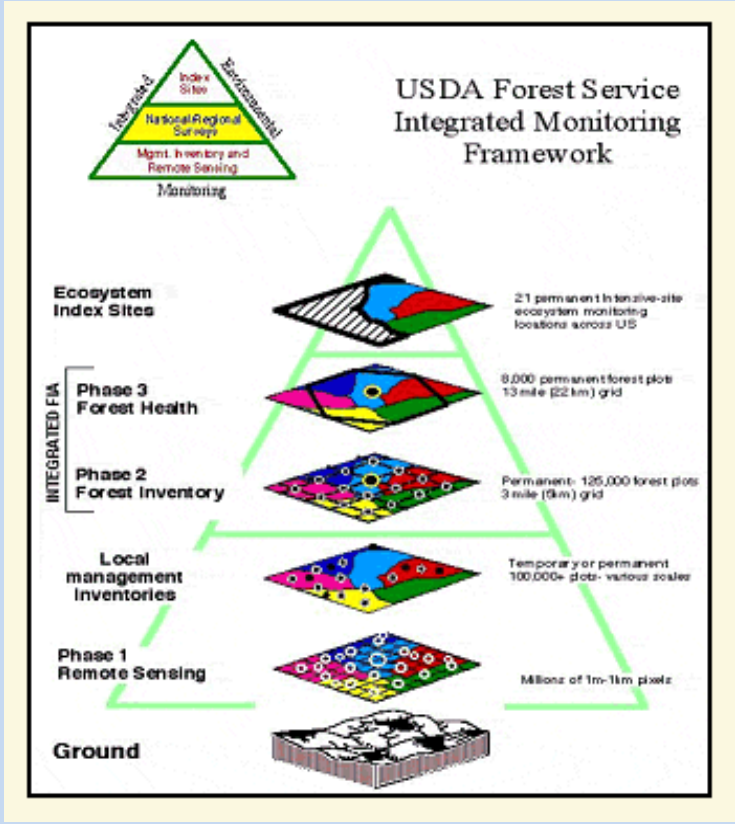
Methods



www.nature.com/articles/srep16518

Forest Inventory and Analysis data





Social cost of carbon (SCC) estimates ($2016 per ton CO_2)

	Average annual discount rate			
Year	**5%**	**3%**	**2.5%**	**3% and 95th percentile**
2015	$13	$42	$65	$121
2020	$14	$49	$72	$142
2025	$16	$53	$79	$160
2030	$19	$58	$84	$176
2035	$21	$64	$90	$194
2040	$24	$69	$97	$212
2045	$27	$74	$103	$228
2050	$30	$80	$110	$245

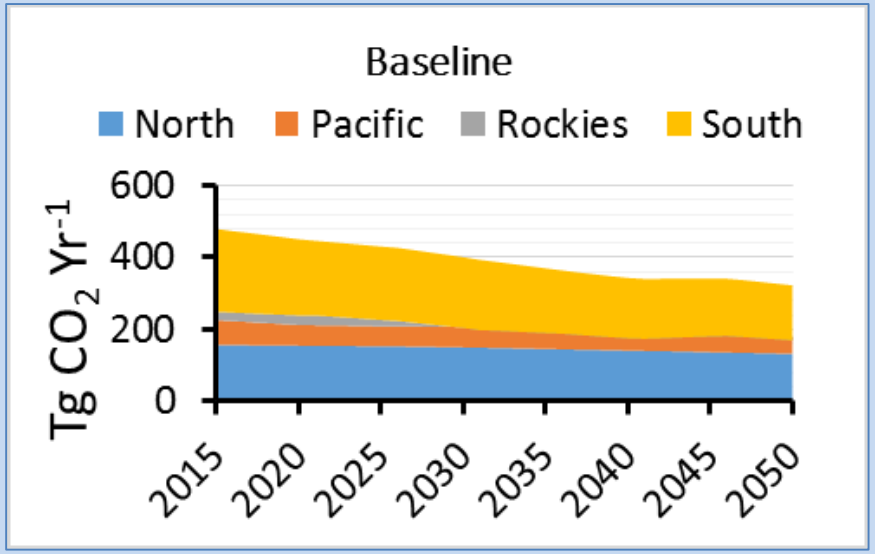
Source: U.S. Interagency Working Group (2015).

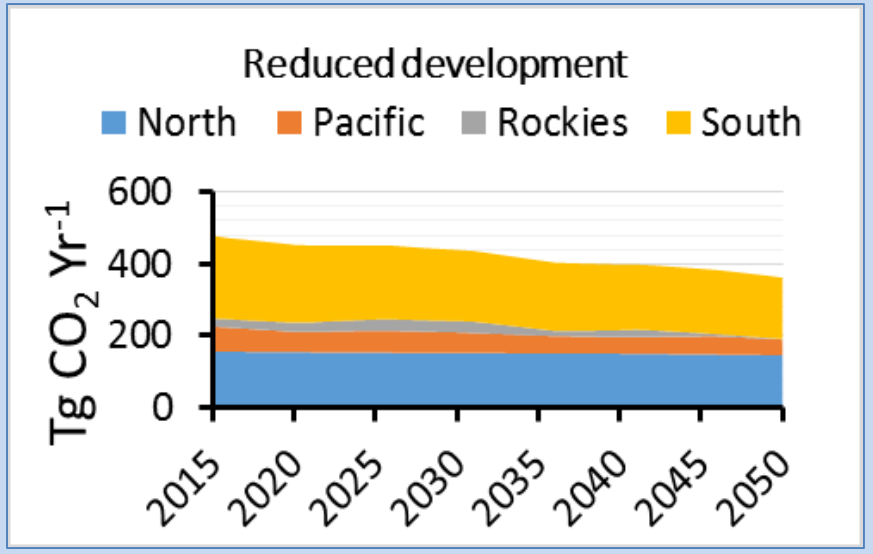
Regions

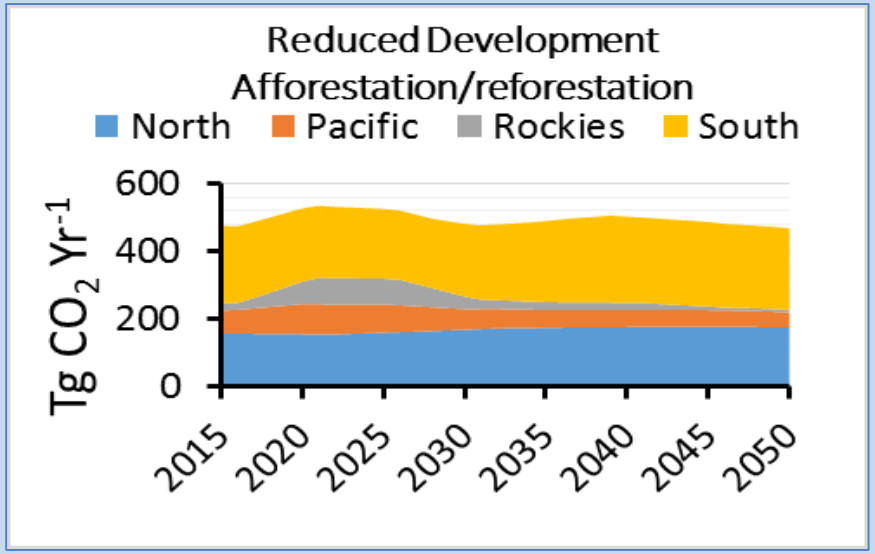
Policy scenarios and components

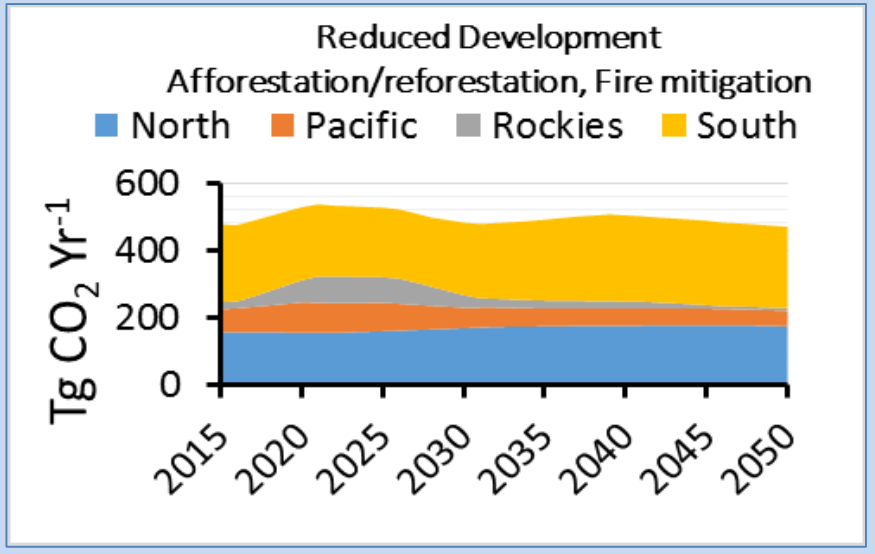
	Scenario components		
Scenario	**Land use scenario**	**Afforestation + restoration program**	**Fire mitigation program**
Baseline	USDA-defined Reference		
Reduced development	USDA-defined Low development		
Afforestation + reforestation	USDA-defined Low development	Yes	
Fire mitigation	USDA-defined Low development	Yes	Yes

Projected annual forest carbon sequestration in regions of the coterminous 48 states





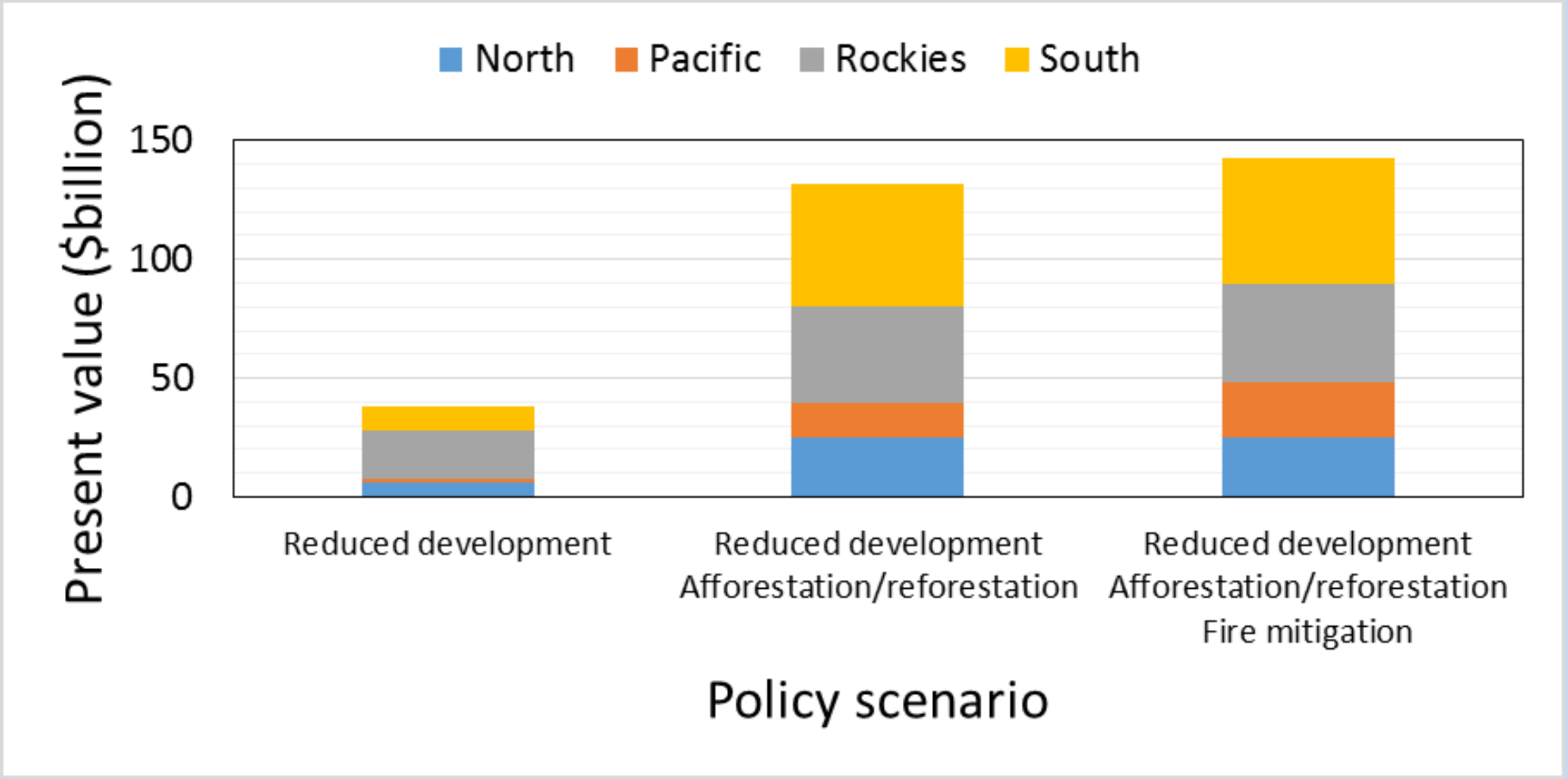




Total present value ($billion) of projected annual CO_2 sequestered in U.S. forests, 2015 to 2050

	Discount rate			
Policy scenario	**5%**	**3%**	**2.5%**	**3% and 95th Percentile**
Baseline	126	517	807	1,552
Reduced development	134	555	867	1,668
Afforestation + reforestation	155	649	1,014	1,951
Fire mitigation	158	660	1,031	1,985

Increase in present value of each policy scenario above baseline scenario (r = 3%)



Conclusions and caveats

1. Existing models and data permit estimating carbon sequestration benefits of policy alternatives.
2. Forests have potential to sequester significant amounts of carbon now, and even more with policy improvements.

---

3. Co-benefits are not addressed.
4. Policy costs are not addressed.

www.cfare.org/publications/

JKline@fs.fed.us

RHaight@fs.fed.us

USDA United States Department of Agriculture

Carbon values per ton of CO_2 equivalent ($U.S. 2014)

Country	2014	2020	2030	2050
Canada	$39	$46	$56	$77
France	53	--	133	319
Germany	133	159	206	365
Ireland	24	52	--	--
United Kingdom	95	105	122	348
United States	41	48	57	78

Source: Smith and Braathen (2015)