

# Forest Health in North America: *Innovative Use of Wood is Part of the Solution*

Presented by Kathryn (Katie) Fernholz



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COMMISSION FOR ENVIRONMENTAL COOPERATION  
COMISSIÓ PER LA COOPERACIÓ AMBIENTAL  
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Canada  
United States of America  
Estados Unidos Mexicanos

Three countries working together to map our shared environment.  
Tres países trabajando juntos para cartografiar nuestro medio ambiente.  
Trois pays s'unissant pour cartographier notre environnement à trois.

**ECOLOGICAL REGIONS OF NORTH AMERICA**  
**REGIONES ECOLÓGICAS DE AMÉRICA DEL NORTE**  
**RÉGIONS ÉCOLOGIQUES DE L'AMÉRIQUE DU NORD**

Level I Nivel I Niveau I

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Ecological regions are areas of general similarity in geoclimatic and biotic factors, and in the type, quality, and quantity of environmental resources. They serve as a spatial framework for the analysis, assessment, management, and monitoring of resources and ecosystem components. There are differences in the natural and regional state of the environment, resources, environmental management systems, and management, setting regional ecosystem management goals, determining existing capacity, as well as developing ecological action and management strategies. The development of a clear understanding of regional and large-scale environmental systems is critical for developing ecological risk, vulnerability, and health.

The maps shown here represent a second attempt to scientifically classify and map ecological regions across the North American continent. Commission for Environmental Cooperation Working Group, 1997. The mapping from 1987 and 1988 was built upon earlier efforts that had begun individually in all three countries (e.g., Wilson 1986, Owsen 1987). These approaches recognized the need to consider a full range of physical and biotic characteristics to explain ecosystem regions (Owsen 1987). Owsen (1987) recognized that the relative importance of such characteristics varies from one ecological region to another, regardless of the hierarchical level. In describing macroecological regions in Canada, Wilson (1986) stated:

Ecological land classification is a process of delineating and describing ecologically distinctive areas of the Earth's surface. Each area can be viewed as a discrete system which has resulted from the match and interplay of the geologic, landform, soil, vegetation, climate, hydrology, and human factors which may be present. The distribution of any one or a number of these factors varies with the other ecological land units. This discrete approach to land classification can be applied successfully on a scale related from very large-scale biogeography to very local ecogeography.

Understanding ecological regions at a continental level is a challenging task. It is difficult, in part, because North America is ecologically diverse and because a nation's territorial boundaries can be a hindrance to seeing and appreciating the perspective across the land-mass of North America. Developing and refining a framework of North American ecological regions has been the product of research and consultation between federal, state/provincial, and regional agencies. These agencies were often government departments, but the initiative also involved non-governmental groups, universities, and academia. The Commission for Environmental Cooperation (CEC) was instrumental in bringing these groups together. The CEC was established in 1986 by Canada, Mexico, and the United States to address environmental concerns common to the three countries. The CEC derives its formal mandate from the North American Agreement on Environmental Cooperation (NAAEC), the environmental side accord to the North American Free Trade Agreement (NAFTA).

These maps represent the working group's best consensus on the distribution and characteristics of major ecosystems on all three levels throughout the three North American countries. The underlying conceptual basis points at mapping ecological regions:

- Ecological classification incorporates all major components of ecosystems: air, water, land, and biota, including humans.
- It is holistic ("the whole is greater than the sum of its parts").
- The spatial and relative importance of factors that are included in the classification process vary from one area to another, regardless of the level of generalization.

Ecological classification is based on bioclimate—resources and natural values assessment as inputs, although in reality, they may not always suit.

- Such classification integrates knowledge; it is not an inventory process.
- It recognizes that ecosystems are heterogeneous—characteristics of one ecosystem based with those of another.
- Map lines depicting ecological classification boundaries generally coincide with the location of zones of transition.

A revised natural biogeographic scheme has been adapted for the different levels of ecological regions. Level I is the coarsest level, dividing North America into 15 broad ecological regions. These highlight major ecological areas, providing the broad backdrop to the ecological mosaic of the continent, setting it in context as global or hemispheric scales. The Level II ecological regions that have been delineated are intended to provide a more detailed description of the large ecological areas that comprise the Level I regions. Level III ecological regions are useful for national and subnational assessment of ecological patterns. At level III, the continent currently contains 143 ecological regions. The level III ecological regions cover aquatic resources and subdivisions of surface land (I, II, and III) ecological regions (CEC 1997, Mahabadi et al. 2001, Owsen 1987, 1997a, 2004, Wilson 1986, Wilson et al. 1990). These smaller divisions address regional environmental monitoring, assessment and reporting, as well as decision-making. Because level III regions are smaller, they allow locally defining characteristics to be identified, and more specifically related management strategies to be formulated.

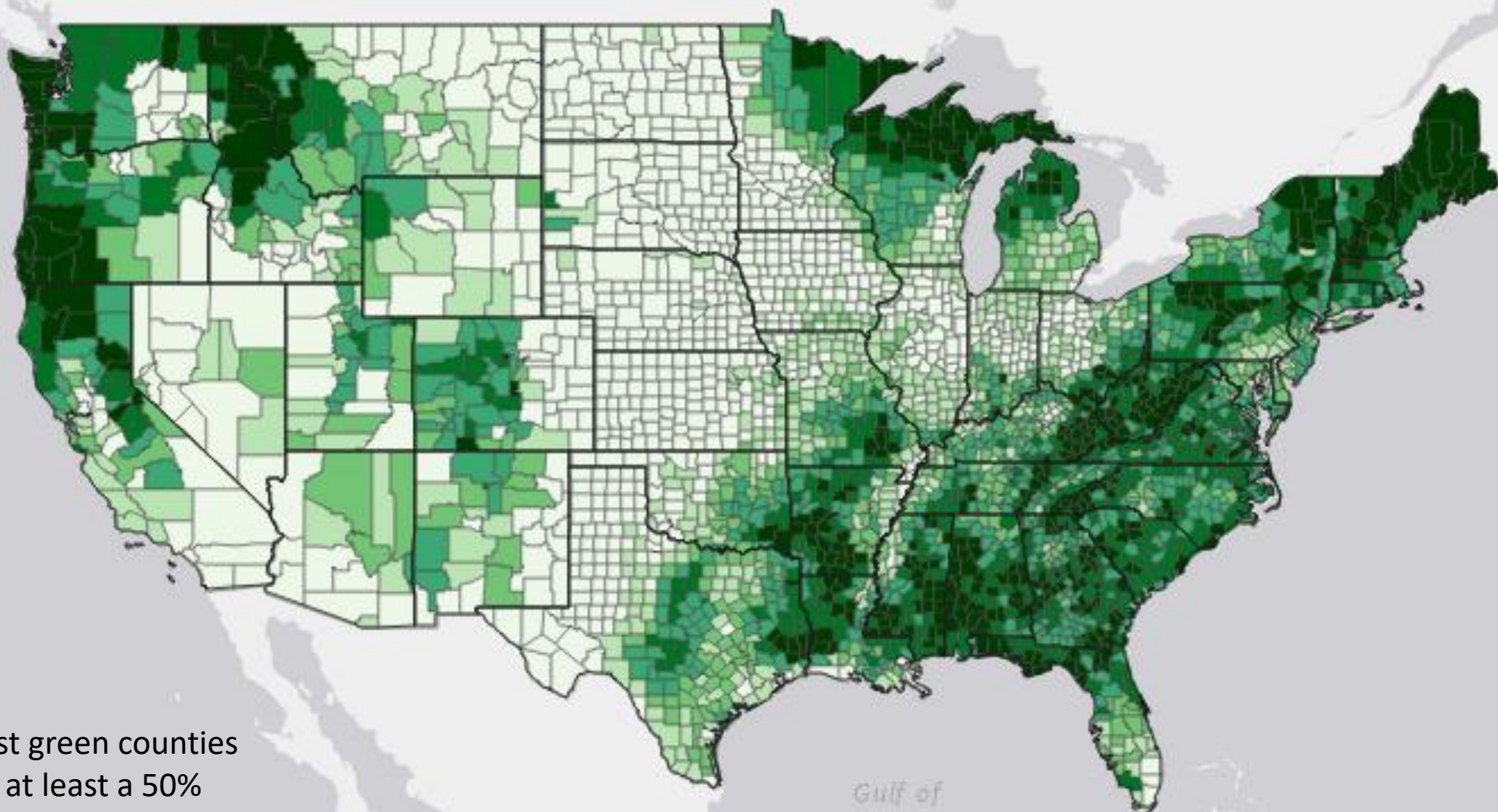
Literature Cited  
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Bogdanski, Bryan. (2008). [Canada's boreal forest economy: economic and socio-economic issues and research opportunities.](#)

The darkest green counties have seen at least a 50% increase in the percentage of forestland area since 1997.

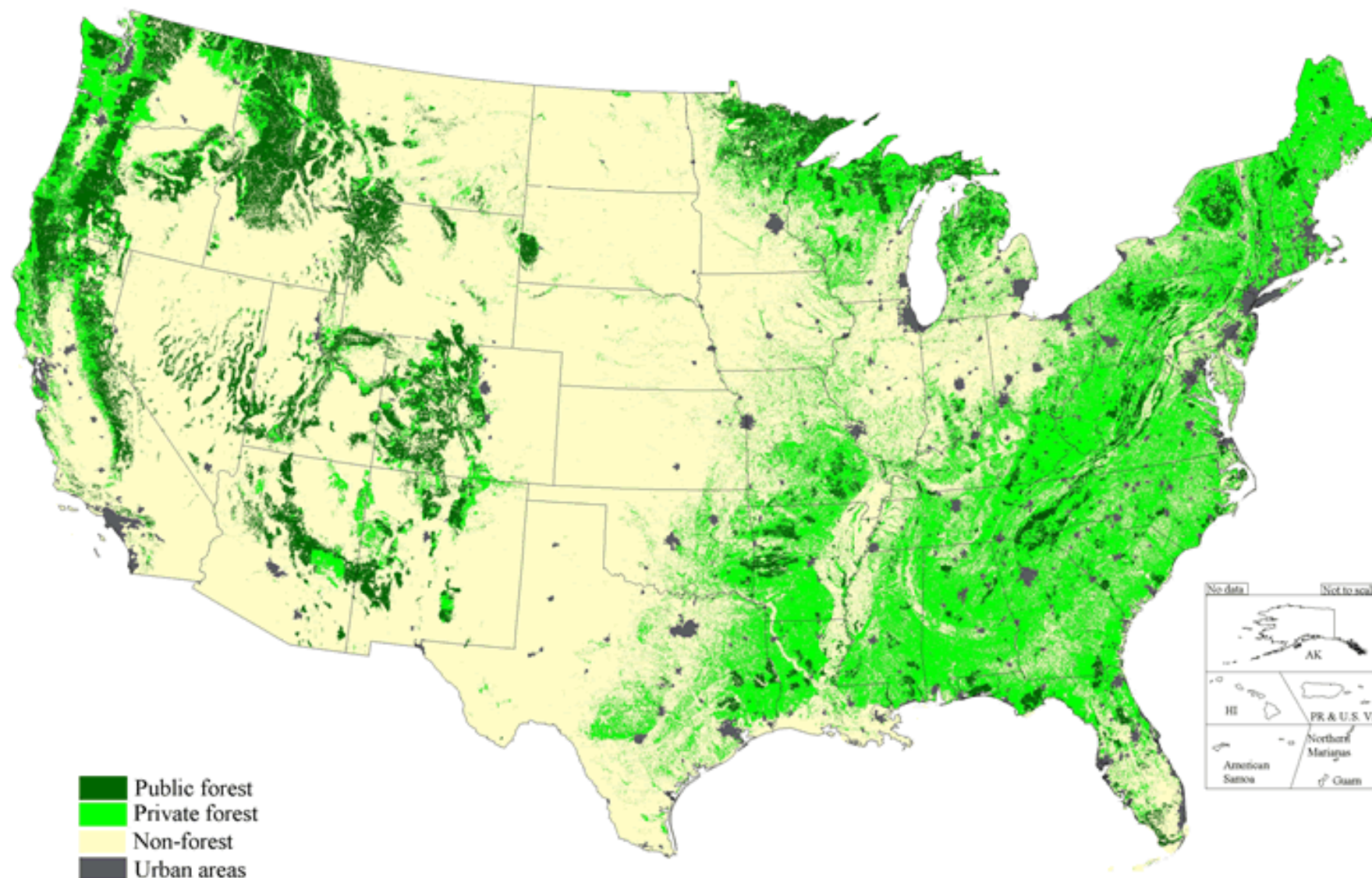




Source: <http://www.bigpictureagriculture.com/2011/05/us-farm-data-maps-density-farm-payments.html>

## Forest Land Ownership

This map displays the basic vegetation (forest vs. non-forest) of the conterminous United States as well as ownership (private vs. public). The lands displayed as "public" include Federal and State lands but do not generally include lands owned by local governments and municipalities.



Public forest  
Private forest  
Non-forest  
Urban areas

USDA Forest Service, State and Private Forestry,  
Cooperative Forestry Staff, Washington Office.



100 0 100 200 300 400 500 Miles

Data sources:  
Forest: NLCD (1992)  
Ownership: PAD (2001)  
States: ESRI Data & Maps 2002  
Urban areas: DCW (1998)



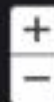


## Sawmills

*Click on a facility to see more information.*



In 2015, U.S. production of lumber from domestic and imported timber sources amounted to some 40,304 MMBF.







HARVARD UNIVERSITY (LEFT); DAVID FOSTER

**Across New England, areas like the Swift River Valley (above, left, in the 1880s and in 2010) in Petersham have seen their forests, once cut down and cleared for farmland, replenished in the 21st century.**



# Wildfire Hazard Potential

## Version 2014

The wildfire hazard potential (WHP) map is a raster geospatial product produced by the USDA Forest Service, Fire Modeling Institute that can help inform assessments of wildfire risk or prioritization of fuels management needs across very large spatial scales (orders of miles). Our specific objective with the WHP map is to depict the relative potential for wildfire that would be difficult for superintendents to quantify. To create this 2014 version we built upon earlier estimates of wildfire likelihood and intensity generated in 2013 with the large fire simulation (LFI) for the fire program analysis system (FAS), as well as spatial fuels and vegetation data from 1980-2010 and past locations of fire occurrence from 1914 to 1981. Areas assessed with higher WHP values, therefore, represent lands with a higher probability of experiencing burning, increasing, and other forms of adverse fire behavior under variable weather conditions, based primarily on 2010 landscape conditions.

As to use, WHP is not an explicit map of wildfire threat or risk, but when paired with spatial data depicting higher valued resources and assets such as communities, structures, or preserves, it can approximate relative wildfire risk to those resources and assets. WHP is also not a forecast or wildfire outlook for any particular season, as it does not include any information on current or forecast weather or fuel moisture conditions. It is instead intended for long-term strategic planning and fuels management.

Previous versions of this product were based on the Wildfire Risk Potential (WRP) map. For more information and to download US data, visit: <http://www.firelab.org/project/wildfire-hazard-potential>

### Legend

— National Forest Administrative Boundaries

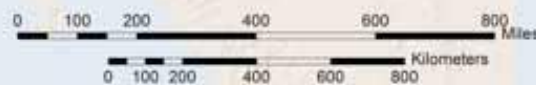
Wildfire Hazard Potential

- Very Low
- Low
- Moderate
- High
- Very High

Developed Lands

Non-burnable Lands\*

Water



Wildfire Hazard Potential	Non-NFS Lands		NFS Lands		All Lands	
	Acres†	Percent	Acres†	Percent	Acres†	Percent
Very Low	807,680,000	89%	84,740,000	20%	453,230,000	84%
Low	331,950,000	39%	82,560,000	19%	364,510,000	39%
Moderate	211,170,000	24%	41,180,000	10%	254,350,000	24%
High	3,883,770,000	44%	27,230,000	6%	163,870,000	17%
Very High	40,790,000	5%	14,090,000	3%	54,880,000	6%
Sum of High and Very High	41,197,770,000	49%	41,320,000	1%	222,860,000	23%
Non-burnable Lands	389,890,000	4%	8,930,000	2%	191,880,000	20%
Water	36,970,000	0%	930,000	0%	37,900,000	0%
<b>Grand Total:</b>	<b>9,152,840,000</b>		<b>419,440,000</b>		<b>9,572,280,000</b>	

\*Non-burnable lands include noncombustible agricultural fields, pavement, concrete, and bare ground.

Map prepared: 12/10/14, Update: 12/10/14, 12/10/14



Using Data: 12/10/14 Forest Service, Fire Modeling Institute, October 10, 2014





**a**



**d**



**b**



**e**



**c**



**f**

Source: *Understanding Eastside Forests*  
[http://oregonforests.org/sites/default/files/publications/pdf/Unst\\_East\\_Forests.pdf](http://oregonforests.org/sites/default/files/publications/pdf/Unst_East_Forests.pdf)







**Table 4. Habitat characteristics and management recommendations for some forest interior birds of North America.**

Species	Nest location	Feeding location	Min. forest size*	Management recommendation
Yellow-throated vireo	C	C	250	selective cutting to maintain partially open canopy.
Red-eyed vireo	C	C	50	harvest techniques that retain at least 70% canopy closure.
Northern Parula	C	C	250	retain 60-70% canopy closure and increase shrubs.
Black-and-white warbler	G	M	750	maintain early successional forest.
American redstart	U	M	80	maintain closed canopy and thin understory trees.
Prothonotary warbler	S	G	250	maintain old-growth stands with dead/dying trees.
Worm-eating warbler	G	G	750	maintain dense understory and low tree basal area.
Louisiana waterthrush	G	G	250	maintain wooded streambanks and thick undergrowth.
Ovenbird	G	G	250	maintain closed canopy and open understory.
Barred owl	S	OU	250	maintain large areas on 150-yr. or longer rotations.
Whip-poor-will	G	O	300	pole-sized even-aged stands, retain decaying trees.
Hairy woodpecker	S	T	10	retain decaying and healthy trees during timber harvest.
Pileated woodpecker	T	T	125	retain dead/decaying trees, 150 yr. or greater rotations.
Acadian flycatcher	S	LC	80	maintain tall closed canopy; thin understory trees.
Kentucky warbler	U	G	80	dense understory with well-developed ground cover.
Hooded warbler	U	U	80	maintain canopy closure and dense shrub layer.
Scarlet tanager	C	C	25	maintain pole-size stands, well-developed canopy.
Red-shouldered hawk	C	O	250	maintain mature forest at 140 to 400 trees/acre.

\* Minimum forest size in acres. (Compiled from Bushman and Therres 1988.)

C = canopy, G = ground, U = understory, S = snag, M = mid-story, SH = shrub, T = trunk,

LC = lower canopy, O = open areas, OU = open understory.



“In the long-term, a sustainable forest management strategy aimed at maintaining or increasing forest carbon stocks, while producing an annual sustained yield of timber, fiber, or energy from the forest, will generate the largest sustained mitigation benefit.”

*- Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report*





## Conclusions

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- North America's ecology provides for incredible forest diversity
- Markets support private landowners and help keep the landscape forested
- Management provides diverse benefits, including mitigating wildfire conditions and supporting wildlife habitat
- Sustainable forestry and use of forest products combine to maximize climate change mitigation
- Bottom line – choosing wood supports forest growth and health in North America and gives us a sustainable (carbon storing!) building material

# QUESTIONS?

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**Kathryn (Katie) Fernholz**

Dovetail Partners, Inc.

[katie@dovetailinc.org](mailto:katie@dovetailinc.org)



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