DEMONSTRATING THE BENEFITS OF PHYTOSANITARY REGULATIONS: THE CASE OF ISPM 15

Eckehard G. Brockerhoff[1], Juliann E. Aukema[2], Kerry O. Britton[3], Joseph F. Cavey[4], Lynn J. Garrett[5], Robert A. Haack[6], Mark Kimberley[7], Andrew M. Liebhold[8], Frank L. Lowenstein[9], Carissa Marasas[4], Amelia Nuding[2], Lars Olson[10], Christa Speekmann[4], Michael Springborn[11], Christina Vieglais[12], and James Turner[7]

[1]Scion (NZ Forest Research Institute), PO Box 29237, Christchurch 8540, New Zealand

[2]National Center for Ecological Analysis and Synthesis, University of California, Santa Barbara, CA 93101

[3]U.S. Forest Service, Research and Development, Arlington, VA 22209

[4]USDA APHIS PPQ, Riverdale, MD 20737

[5]USDA APHIS PPQ CPHST, Raleigh, NC 27606

[6]U.S. Forest Service, Northern Research Station, East Lansing, MI 48823

[7]Scion (NZ Forest Research Institute), Private Bag 3020, Rotorua 3046, New Zealand

[8]U.S. Forest Service, Northern Research Station, Morgantown, WV 26505

[9]The Nature Conservancy, Forest Health Program, Sheffield, MA 01257

[10]University of Maryland, Agricultural and Resource Economics, College Park, MD 20742

[11]University of California, Environmental Science and Policy, Davis, CA 95616

[12]University of California, Bren School for Environmental Science and Management, Santa Barbara, CA 93106

ABSTRACT

Invasions of non-indigenous insects and pathogens threaten trees and forest ecosystems worldwide. For example, the arrival and spread of the pathogens causing chestnut blight and Dutch elm disease, along with the bark beetles vectoring the latter, had dramatic effects on North American forests. Despite our improved awareness of the risks associated with biological invasions, globalization and an increase in international trade have facilitated the continued arrival and establishment of non-indigenous forest pests and diseases. Several recent invaders, including the Asian longhorned beetle (*Anoplophora glabripennis*) and emerald ash borer (*Agrilus planipennis*), are particularly worrying because they infest and kill apparently healthy host trees. The overall economic impacts of invasive forest pests, including damage to trees, management and control actions, loss in amenity value, trade restrictions, and various other costs are expected to amount to many billions of dollars.

The use of wood packaging materials in international trade has been identified as an important pathway for the introduction of insects and pathogens associated with wood and timber. In recognition of the risk of further invasions occurring as a result of the use of untreated wood packaging materials (such as pallets, cases, drums, skids, and dunnage), the International Plant Protection Convention (IPPC) developed the International Standards for Phytosanitary Measures (ISPM) No. 15 (Guidelines for regulating wood packaging material in international trade). ISPM 15 prescribes the use of heat treatment or methyl bromide fumigation to kill any life stages of insects and pathogens associated with wood packaging materials before export and thereby mitigate pest risks. ISPM

15 has been widely adopted since its endorsement by the Interim Commission on Phytosanitary Measures in March 2002; as of 2010, it has been implemented by more than 50 countries. In the United States, all wood packaging material entering the country has had to comply with ISPM 15 since February 1, 2006.

The Nature Conservancy and the National Center for Ecological Analysis and Synthesis (NCEAS) at the University of California, Santa Barbara, have collaborated to establish a working group for increasing our understanding of the effects of phytosanitary policy in preventing the establishment and spread of invasive forest pests. The specific objectives of the NCEAS working group are to (1) estimate the costs and benefits of phytosanitary policy, (2) develop a conceptual model incorporating both ecological and economic elements to capture these costs and benefits, and (3) fully integrate and parameterize these models for a formal cost-benefit analysis of ISPM 15 as a case study. Our ultimate aim is to calculate the net benefits or costs of this policy, thereby providing an analytical framework for the development of further phytosanitary policies designed to mitigate other high-risk pathways, such as live plants (i.e., Plants for Planting).

ISPM 15 was chosen for a case study because its implementation in 2006 enabled a before and after analysis by comparing real-world data for the pre-ISPM 15 and post-ISPM 15 periods. Various data sources and a trade model are being used to estimate the costs of ISPM 15 compliant treatments and lost benefits from trade caused by the increased cost of transporting commodities. The benefits of the policy are being estimated as the averted damages, compared to a no-policy situation. These averted damages are estimated from the reduction in pest arrival rate (i.e., reduced propagule pressure) and the resulting decrease in the rate of pest establishments. USDA APHIS records of pest interceptions at U.S. ports-of-entry (AQIM and PestID) are being used to estimate changes in pest arrival rate due to ISPM 15, and the relationship between the interception rate of particular pest species and their establishment. Interceptions serve as a proxy of arrival rate because there is no information on the actual rate of pest arrival.

Preliminary results indicate that ISPM 15 has not completely closed the pathway associated with wood packaging materials because several post-ISPM 15 interceptions have been recorded, although there appears to be a downward trend. We have identified a number of confounding factors that could either be masking the effects of ISPM 15 or impeding its desired effects. Our analyses and economic and ecological models are being finalized, and we plan to release the main findings in late 2010. Another output will be advice for policymakers on improved data collection that would greatly assist with future efforts in demonstrating the effects of other phytosanitary measures, such as Plants for Planting, which is currently under development.