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Canadian Forest Service Research Aimed at Keeping Asian Gypsy Moth out of British Columbia

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Every year, thousands of Asian ships arrive on the coast of British Columbia carrying everything from cars and steel to containers of running shoes. Occasionally some unintended cargo also arrives in the form of Asian gypsy moth egg masses hiding on the ship's hulls and in the nooks and crannies of shipping containers. While ship inspections and certification programs run by the Canadian Food Inspection Agency (CFIA) catch most of these stowaways, the system is not perfect and every so often some gypsy moths make it onto Canadian trees. The permanent establishment of Asian gypsy moth (AGM) populations in Canada would gravely impact Canada's forests, biodiversity and economy so Dr. Brian Van Hezewijk and Kaitlyn Schurmann are developing a new

Asian Gypsy Moth

The Asian gypsy moth is an invasive insect. It poses a significant threat to Canada's forests, biodiversity and economy. These moths can feed on a wide range of economically important tree species, as well as other important plants.

Ships and cargo including containers and used vehicles can carry the egg masses of these moths to Canada from China, Japan, North Korea, South Korea and Russia (Far East region). In the right conditions, caterpillars hatch from these egg masses and using the wind, can disperse over large distances to find food.

Adult female, Asian gypsy moth

John Ghent, Bugwood.org

Asian gypsy moth egg mass
USDA APHIS PPQ

Asian gypsy moth Larva(e)
John Ghent

Adult male (bottom) and female (top) Asian gypsy moth shown for comparison
USDA APHIS PPQ

All from Bugwood.org

Hypothetical risk map for Burnaby area of B.C.'s lower mainland. Red signifies higher risk areas as indicated by a risk measure which incorporates the following variables: port locations, trapping results, tree cover. Red dots show the location of gypsy moth traps.

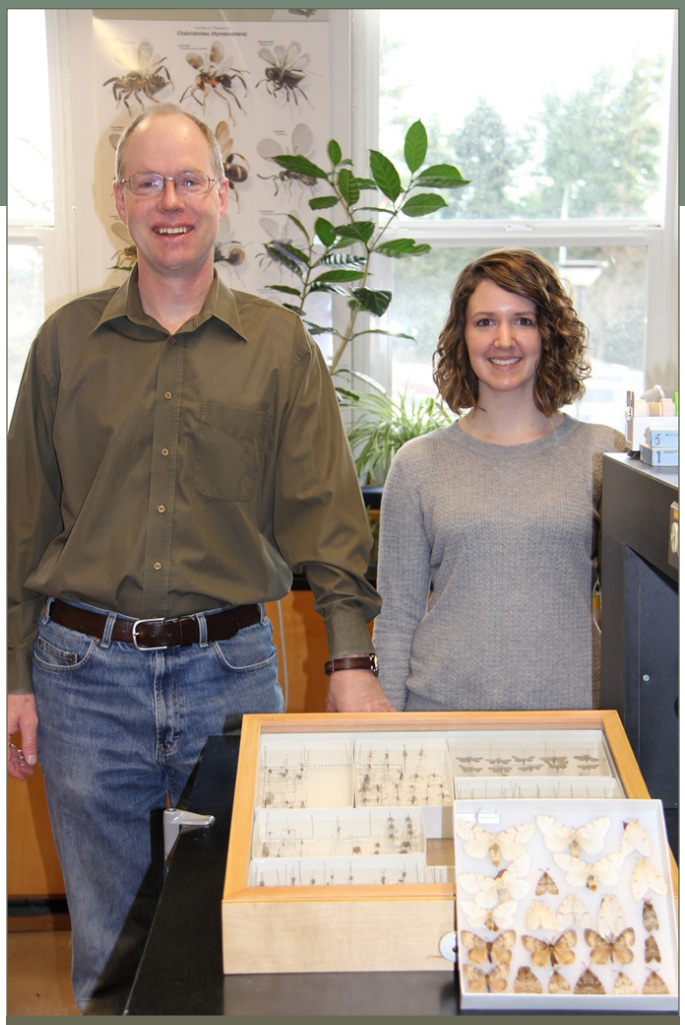
type of risk mapping system that will help detect these invaders and eradicate populations before they grow to unmanageable sizes.

Shipping containers waiting to be inspected at port for possible infestation

Larry R. Barber, USDA Forest Service, Bugwood.org

Traditional risk models produce maps that rapidly become obsolete as conditions change. Using an open-source software platform (R), Brian and Katelyn are developing a dynamic risk model to demonstrate how current information on climatic suitability, location and timing of trap catches, shipping activity, high-resolution land cover data and weather conditions can be translated into measures of risk and combined with expert knowledge to generate real-time risk maps and graphs.

"We actually know quite a lot about managing the AGM risk because of our experience preventing the establishment of the closely related European gypsy moth," says Natural Resources Canada, Canadian Forest Service (CFS) scientist, Dr. Brian Van Hezewijk, "but the situation is always changing". There are a lot of factors that affect the chance that an egg mass laid on a container in Japan, for example, will end up producing a breeding population in Canada. In order to make the right decisions around where to place traps, or when start an eradication program, layers of complex information need to be assembled and synthesized. What we are developing is a tool that can rapidly gather together all the relevant information around gypsy moth risk, combine it, and present it in an easy-to-understand form.



Brian Van Hezewijk and Kaitlyn Schurmann in the Pacific Forestry Centre's Defoliator Ecology Lab

Southwestern British Columbia is being used as a demonstration case. The next step will be to meet with experts to refine the model. The final program will be flexible to enable incorporation of new and better resolution data as it becomes available.

Dynamic risk maps and summaries generated by the model will guide management of AGM at each stage of the invasion process, from prevention to detection to eradication. The results will aid in refining detection and trapping protocol by identifying precisely where and when the risk is greatest. In this way, the traps can be deployed strategically to best determine the size of an introduced population, and how best to eradicate it. By better capturing all the available information and synthesizing it in a reproducible way, the model will facilitate a more evidence-based decision process.

Links

Natural Resources Canada

Forest Invasive Alien Species *https://www.exoticpests.gc.ca/home*

Pacific Forestry Centre *http://www.nrcan.gc.ca/forests/research-centres/pfc/13489*

Canadian Food Inspection Agency

Asian Gypsy Moth *http://www.inspection.gc.ca/plants/plant-pests-invasive-species/insects/gypsy-moth/asian-gypsy-moth/eng/1330353359964/1330353499535*