Symposium Abstracts: Alien Invertebrate Species in B.C.

Entomological Society of British Columbia Annual General Meeting, Pacific Forestry Centre, Victoria, BC, Oct. 20, 2007

Back from the brink: pests, packaging and pathways

L.M. Humble and E.A. Allen. *Natural Resources Canada, Canadian Forest Service, Victoria, BC, Canada, lhumble@nrcan.gc.ca.*

Trade in wood and wood products has long been acknowledged as a pathway for the transport of bark- and wood-boring arthropods. Some of the species inadvertently moved have been able to successfully establish and breed well beyond their native ranges. In the last two decades, multiple non-indigenous Coleoptera, including *Agrilus planipennis* (Buprestidae), *Tetropium fuscum* and *Anoplophora glabripennis* (Cerambycidae) and *Tomicus piniperda* (Curculionidae: Scolytinae) and one hymenopteran, *Sirex noctilio* (Siricidae) have established in Canada. The primary pathway for most recent introductions is wood packaging and dunnage associated with the commercial transport of commodities. Examples are given of recent interceptions in British Columbia on wood packaging from Europe and Asia. To address the global movement of pests with wood-packaging, the global community under the auspices of the International Plant Protection Convention recently adopted an international standard that requires treatment of wood-packaging used in international trade to prevent future introductions associated with this pathway. The development and implementation of this standard (ISPM-15) as well as the research supporting the treatments employed are reviewed. This standard should significantly reduce the global movement of non-indigenous species associated with wood packaging.

From all over the map: museums and the public's role in documenting new or expanding populations

R.A. Cannings. *Royal British Columbia Museum, 675 Belleville Street, Victoria, B.C., Canada V8W 9W2, Phone: (250) 356-8242, Fax: (250) 356-8197, E-mail: rcannings@royalbcmuseum.bc.ca.*

Members of the public constantly approach museum entomologists when an unfamiliar insect or other arthropod attracts their attention. The popularity of digital photography and the Internet has significantly increased these contacts. Although dealing with public inquiries is time consuming, the Royal BC Museum (RBCM) encourages them as an important part of the museum's work.

Unusual records regularly arrive at the RBCM or are posted on Internet sites and may initiate or support museum research, collections development and public programming. Inquiries about *Polistes dominulus* (Christ) (Hymenoptera: Vespidae), *Noctua pronuba* (Linnaeus) (Lepidoptera: Noctuidae), *Meconema thalassinum* (De Geer) (Orthoptera: Tettigoniidae) and *Exaireta spinigera* (Wiedemann) (Diptera: Stratiomyidae) stimulated the gathering of specimens for our collection and data for publications documenting the arrival or spread of these species in BC.

Frequently we enlist the public to help record the changing distribution and status of species (including invasive ones), especially if they are easily identified. A good example is *Mantis religiosa*, originally introduced to BC in the 1930s, but whose range has rapidly expanded in the Interior since the late 1990s. Light-producing lampyrid beetles have been documented in BC mainly with the help of naturalists; it is still unclear if one widespread species of *Photinus* is introduced or native.

As for other arthropods, the RBCM receives dozens of inquiries annually about spiders. Most spiders reported around

homes, especially some species of *Tegenaria*, *Xysticus, Pholcus, Aranea* and *Dysdera*, are alien introductions. *Dysdera crocata*, one of these introduced spiders, is almost cosmopolitan and specializes in feeding on terrestrial crustaceans of the Order Isopoda. These isopods (*Porcellio scaber*, *Armadillidium vulgare*, *Oniscus asellus* and others), so abundant in our gardens, are also aliens.

When forest management and climate change collide: the eruption and spread of mountain pine beetle populations in western North America

Allan L. Carroll. *Canadian Forest Service, Pacific Forestry Centre, 506 West Burnside Road, Victoria, BC, Canada, V8Z 1M5, Tel: 250.363.0639, Fax: 250.363.0775, Email: acarroll@pfc.cfs.nrcan.gc.ca.*

The mountain pine beetle is native to the pine forests of western North America where it normally exists at very low densities, infesting only weakened or damaged trees. Under conditions conducive to survival, populations may temporarily increase allowing beetles to infest healthy trees. On rare occasions, these increases are rapid and widespread, leading to landscape-level outbreaks and the mortality of large numbers of trees. Although there have been four outbreaks during the past century in western North America, the ongoing epidemic is unprecedented in its size and severity, causing the mortality of mature pine in over 13 million hectares in British Columbia alone. In recent years, the mountain pine beetle has successfully breached the northern Rocky Mountains. Small populations are now scattered over the Alberta Plateau where lodgepole pine hybridizes with jack pine forming a corridor of susceptible hosts extending to the boreal forest. Given predictions of increasingly suitable climate for MPB across Canada, invasion of the boreal forest is a plausible threat. This paper will examine the independent and interacting influences of forest management practices and climate change on the mountain pine beetle and its potential for invasion of the boreal forest.

Challenges in mitigating the risk of introduction of invasive alien species

Gabriella Zilahi-Balogh. *Canadian Food Inspection Agency, 1905 Kent Rd, Kelowna, BC, V1Y 7S6, Canada, tel./tél: 250-470-5176, fax/téléc: 250-470-4899, zilahibaloghg@inspection.gc.ca.*

The Canadian Food Inspection Agency (CFIA) has a long history of preventing pest introductions resulting from international trade. However, with increasing trade and movement of plant products internationally, invasive alien species are an immediate and growing threat to Canada's environment and economy. CFIA has the legal authority under the Plant Protection Act to prevent importation and exportation, reduce spread, and control plant pests. The Plant Health Division of CFIA prevents new pest introductions through science-based regulation and enforcement. The programs branch is responsible for developing import and domestic policies for movement of plants or plant products to prevent unintentional pest introduction or distribution. These policies are developed based on pest risk analysis of a commodity or pest. The operations branch implements policies through inspection, surveillance, control and eradication activities. Some of the challenges and solutions in mitigating the risk of introduction of invasives species are addressed using examples.

Non-indigenous inter-tidal species in British Columbia

Graham Gillespie. *Shellfish Research Biologist Marine Ecosystems and Aquaculture Division, Fisheries and Oceans Canada, Pacific Biological Station, 3190 Hammond Bay Road, Nanaimo, B.C. Canada, V9T 6N7, Phone: (250) 756-7215, Fax: (250) 756-7138, Email: gillespieg@pac.dfo-mpo.gc.ca.*

British Columbia (BC) has a long history of introduction of intertidal non-indigenous species (NIS) beginning with oysters and their fellow travellers deliberately introduced for culture, but also including species that arrived unintentionally

through shipping and live trade vectors, as well as northward dispersal from the US. The list of intertidal NIS is dominated by molluscs (25 species), followed by crustaceans (8), algae and plants (5), polychaetes (4), anemones and flatworms (1 of each). Invasive species diversity is highest in the Strait of Georgia (34 species) and decreases in outside waters (west Vancouver Island 17) and with increasing latitude (Johnstone Strait 5, North Coast 4, Queen Charlotte Islands 2). Twenty-two of 42 intertidal NIS recorded from BC were Atlantic in origin, 19 were from the Northwest Pacific and one from the South Pacific. Likely vectors of introduction include aquaculture (deliberate and unintentional; 30), shipping (hull fouling, ballast water or recreational vessels; 13), trade in live plants or food (4) and dispersal north from southern introductions (3). Although aquaculture was the predominant historical introduction vector, ballast water and hull fouling are currently of greater concern. Some species' distributions are limited by temperature; their range within and beyond BC will increase if climatic projections are accurate. Although most discussion of the impacts of non indigenous species is justifiably focussed on the negative, the establishment of Pacific oysters and Manila clams have led to the development of economically valuable culture and fishery industries.

Challenging invasive species

Judith H. Myers. *Departments of Zoology and Agroecology, University of British Columbia, Room 3358 Biosciences Bldg., 6270 University Blvd., Vancouver, B.C. V6T 1Z4, Phone 604-822 3957, Fax 604 822-2416, Email: myers@zoology.ubc.ca.*

Three approaches to invasive species are (1) to do nothing, (2) to attempt eradication and (3) to initiate a biological control program. History has shown that sometimes introduced species go through an initial phase of outbreak and spread, but that populations eventually decline to lower and less problematic densities. An example of this is the European cranefly that was a serious pest of pastures and lawns in the 1960s but declined in the 1970s and 1980s in association with the occurrence of protozoan disease. Eradication of introduced species is difficult and nearly impossible after they have become well established. Goals of area-wide suppression and slowing the spread are more attainable; changes to terminology could sometimes help with public relations. Finally, recent biological control of weed programs such as that for purple loosestrife and diffuse knapweed show that if an effective agent can be found, the reduction of weed densities can be dramatic.

Aliens at your fingertips

Vince Nealis. *Canadian Forest Service, Pacific Forestry Centre, 506 West Burnside Road, Victoria, BC, Canada, V8Z 1M5, Tel: 250.363.0639, Fax: 250.363.0775, Email: vnealis@NRCan.gc.ca*

A meta-database on forest alien insects and diseases is being developed from historical Canadian Forest Service survey data. Mapping and query applications are included as well as links to source data and biological information. This project is described briefly and its capability illustrated with analysis of the invasion of Canada by gypsy moth and future potential range under climate change. It appears that gypsy moth reached the climatic limits of its range in eastern Canada by 1990 and the range then remained relatively static. This will change little with climate-change projections over the next 50 yrs. The potential climatically-suitable range in west of the Great Lakes, however, will increase markedly over that same time period and overlap with suitable host plant ranges. Thus, the susceptibility and risk of gypsy moth to western Canada in increasing.

Vector control pest management

Christy MacDougall. *1737 Broadway Street, Port Coquitlam BC V3C 2M9, Tel (voice mail) 604.927.5447, Fax 604.927.5448, Email: macdougallc@portcoquitlam.ca*

The Tri-Cities Vector Control Department is a municipal agency that serves the

cities of Port Coquitlam, Coquitlam and Port Moody. We provide pest management information, education, advice and intervention programs for residents and municipal staff so that public health and community liveability is improved and protected.

The primary goal of our Northeast Sector West Nile Virus Mosquito Management Program is to reduce the human risk of contracting WNV by limiting populations of mosquito species implicated in transmitting the virus and thereby reducing the size of the infected bird reservoir. Program activities include mapping catch basins and surface water locations, sampling for mosquito larvae, species identification of larval and adult samples, applying larvicides, pre- and post treatment sampling, adult trapping, determining larvicide efficacy and GPS/GIS data management. *Culex pipiens,* a species introduced to North America in the late 1800's, is of great concern because it is found in high numbers in catch basins and poses a high risk for transmitting WNV to birds and humans. *Culex tarsalis* is another important species in transmitting the virus, however, we do not find this species in high numbers in the local area.

Ticks and tick-borne diseases in BC

Muhammad G. Morshed. *Zoonotic Diseases & Emerging Pathogens, Laboratory Services, BC Centre for Disease Control; Clinical Professor, Department of Pathology & Laboratory Medicine, University of British Columbia, Vancouver, British Columbia.*

In North America, there has been a substantial interest in ticks and tick-borne diseases, such as Lyme, Relapsing fever, Anaplamosis/Ehrlichiosis, Babesiosis, Q fever, Rocky Mountain spotted fever (RMSF), tick-borne viral encephalitis, etc. Recently, there has been dramatically increased awareness of the role of human animal interaction, which is generating emerging infectious disease risk among B.C. residents. A variety of factors, such as the growth of wildlife populations, outdoor workers, outdoor recreational activities and wildlife rehabilitation, allow people to come into close contact with wild animals and insects directly and indirectly, which favours the transmission of vector-borne diseases.

BCCDC has engaged in identifying high-risk areas for ticks and tick-borne disease in B.C. since 1991. The data obtained from field studies and clinical samples showed that both hard ticks and soft ticks are present in BC. Among hard ticks, *Ixodes pacificus* and *Darmacentor andersoni* are the two predominant species found in BC. *I. pacificus* is found mostly in Fraser Valley and Vancouver Island and *D. andersoni* is found mostly in the Interior of BC. Other hard ticks found in BC are *I. angustus*, I. *soricis*, *I. auritulus*, *D. variabilis, Rhipicephalus sanguineus,* etc.

One of the most common tick borne diseases in BC is Lyme disease. A total of 68 cases was reported in BC from 1997 to 2006 and almost half of them are travel related. The causal organism for Lyme disease, *Borrelia burgdorferi,* is found in *I. pacificus* and *I. angustus* ticks (in very low numbers). In BC, *B. burgdoreferi* positive ticks are mostly found in the lower mainland and the south-east part of Vancouver Island

The next common tick-borne disease in BC is Relapsing fever caused by a soft tick *Ornithodoros hermsi*. This tick species has been mostly reported from the Interior of BC. It is very difficult to collect this tick because of its nocturnal nature. The causal pathogen for relapsing fever is *Borrelia hermsii.* A total of 32 cases was reported in BC from 1993 to 2005; all them were either residents or travelled to the Interior of BC.

In BC we have also found sporadic seropositive cases of Anaplasmosis/Ehrlichiois, Q fever and RMSF. Detection of antibodies against new and re-emerging tick-borne diseases will provide evidence of the presence of emerging pathogens in British Columbia. The result of this investigation will also help to create public awareness about the possible presence of different tick-borne diseases.

Exotic terrestrial gastropods in southwestern British Columbia

Kristiina Ovaska and Lennart Sopuck. *Biolinx Environmental Research Ltd., 1759 Colburne Place, Sidney, BC V8L 5A2; e-mail: kovaska@shaw.ca; biolinx@shaw.ca*

Over 20 species of introduced slugs and land snails are known from British Columbia, and many species are ubiquitous in disturbed areas. Since 1999, we have surveyed hundreds of sites for terrestrial gastropods on Vancouver Island, Haida Gwaii (Queen Charlotte Islands), and southern mainland BC. Forests with limited public access, including Gwaii Haanas National Park, had a very low incidence of introduced gastropods. In contrast, Garry oak ecosystems on Vancouver Island and sand dune habitats on Graham Island, Haida Gwaii, supported high densities of introduced species. These habitats are vulnerable to invasion by introduced gastropods due to their semi-open nature and high human use and/or their location near population centres. Adverse effects on native species and ecosystems could occur through competition, predation, disease, and damage to plants but remain to be investigated.