

IAS management options - mitigation, control and eradication

Asia Pacific Forest Invasive Species Network

Beijing China
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Can invasive species be:

Mitigated?
Controlled?
Eradicated?

Eradication

“Removal of every potential reproducing individual of a species or the reduction of their population density below sustainable levels”

(Meyers et al. 2000)

Historical Forest Alien Species Introductions to Canada

Invasive Alien Species	Year	Entry Pathway
Beech bark disease	1890	live plant
Chestnut blight	1904	live plant
White pine blister rust	1910	live plant
Gypsy moth	1924	escape/adventive
Dutch elm disease	1944	logs/packageging
Butternut canker	1991	live plant
Pine shoot beetle	1992	wood packaging
Brown spruce longhorned beetle	1999	wood packaging
Emerald ash borer	2002	wood packaging
Asian longhorned beetle	2004	wood packaging
<i>Sirex</i> wood wasp	2005	wood packaging

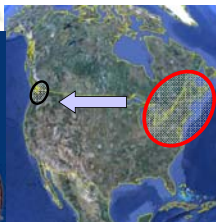
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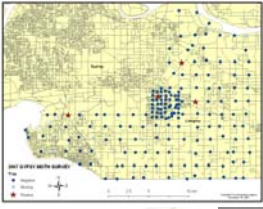
Examples of Eradication Success

Lymantria dispar - European Gypsy Moth

- The gypsy moth was introduced into the US in 1868
- Established in eastern North America
- Human-mediated movement to west



Annual pheromone detection surveys



Eradication with bio-insecticide



Natural Resources Canada
 Canadian Forest Service

Resources naturelles Canada
 Service canadien des forêts

Annual pheromone detection surveys



Eradication with bio-insecticide



33 years of success!

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Examples of Eradication Successes

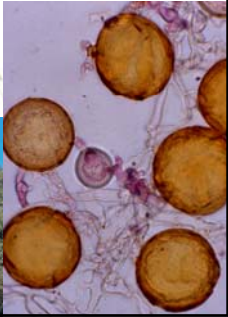
Anoplophora glabripennis - Asian Longhorned Beetle

- First observed in US in 1994, Canada in 2004
- Aggressive host eradication



Sudden Oak Death

Phytophthora ramorum



Mitigation of Forest Alien Invasive Species



Natural Resources Canada
Canadian Forest Service

Resource naturelles Canada
Service canadien des forêts

Criteria for eradication success Reasons for eradication failures

- Timing – when is the alien species discovered
- Detection tools – delimitation of population
- Geography – practicality of eradication efforts
- Biology – specific characteristics of alien organism
- Cost – 1st 99% costs less than last 1%
- Public acceptance

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Control of Forest Alien Invasive Species

- Containment – prevent natural and human dispersal
- Slow the Spread – control the leading edge
- Biological Control – natural enemies
- Sterile Insect Release – species specific
- Insect Pathogens – bacteria, fungi, viruses



Mitigation of Forest Alien Invasive Species

Mitigation: measures to reduce the risk of pest movement

Commission on Phytosanitary Measures

- Governing body of the International Plant Protection Convention (IPPC)
- Create international standards to guide countries' plant health regulations



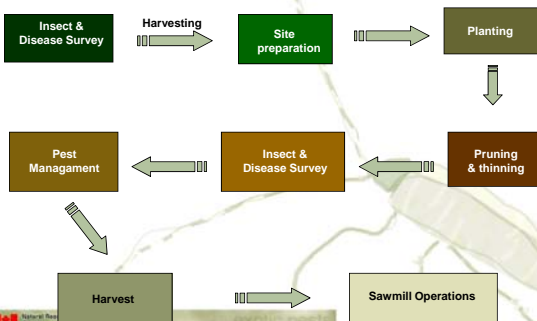
International Standards Address Pathway Risks

Phytosanitary regulations

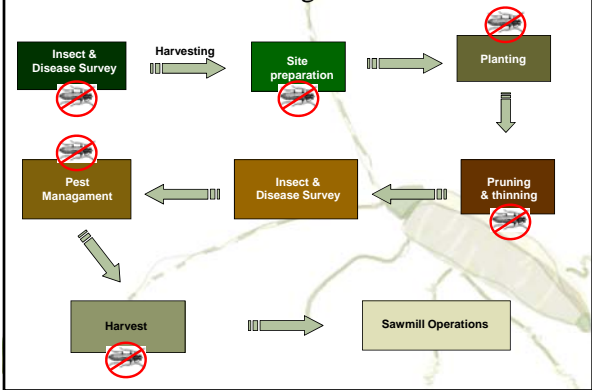
International Standards

- Wood Packaging (ISPM 15) – approved 2002, 2009
- Wood commodities draft ISPM

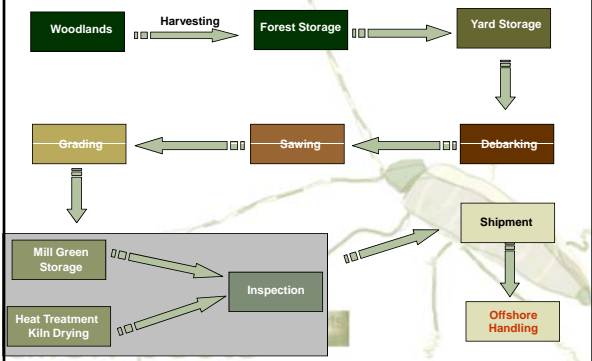
Growing Trees



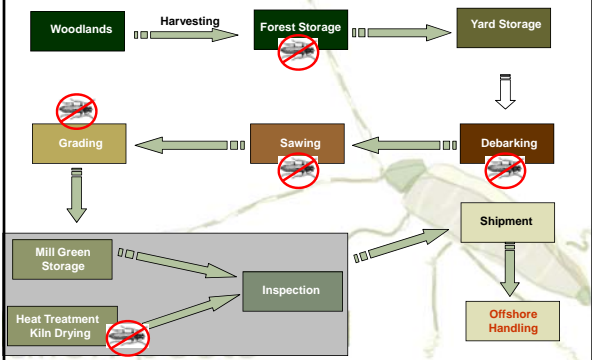
Growing Trees



Harvesting and Sawing Wood



Harvesting and Sawing Wood



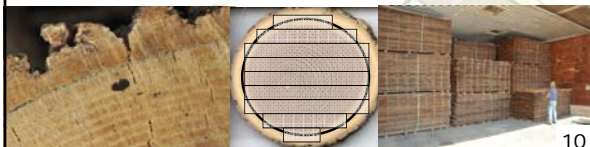
Integrated Measures for Pest Risk Reduction



Agrilus planipennis

Production measures reduce risk

Measure	% reduction
Debarking	99.9%
Sawing	75%
Heat treatment (60 C)	99.9%



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Pathways

- Analyze of import and export pathways
- Determine critical control points where pest reduction measures can be implemented
- Develop phytosanitary measures that allow the safe trade of forest commodities

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Import Risk Reduction

Live plant pathway

- Complicated – many hosts, many pests, different production methods
- Understanding plant import commodities and associated pests allows development of effective phytosanitary measures

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Summary

- Successful eradication of forest pests very difficult – rare
- Control programs challenging and expensive
- Preventing pest entry and establishment best option

Science-based international standards will lead to harmonized national phytosanitary regulations