A Global Perspective on Forest Invasive Species:

The problem, causes and consequences

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'It's a small world'

What is an Invasive Species?

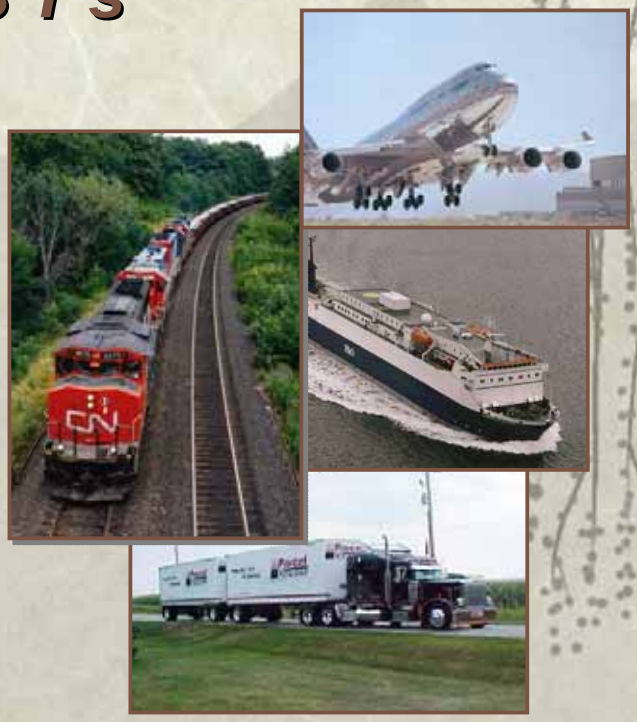
- An organism that is non-native to the ecosystem under consideration and….
- Whose introduction will cause or is likely to cause economic or environmental harm or harm to human health

General Traits of a Successful Invasive Species

- Rapid growth rate
- Efficient dispersal capabilities
- Large reproductive output
- Broad environmental tolerance

Causes: *"The 3 T's"*

- Travel (faster)
- Transport (further)
- Trade (increased)



North America—Important Pathways

- Nursery plants
- Solid wood packing

Global Issues-

- Worldwide, biological invasions of alien invasive species are acknowledged by scientists and governments to be a major threat to native biological diversity (Union of Concerned Scientists 2003)
- Invasive species are among the top drivers of environmental change globally (Sala et al. 2000)

Invasive Species in Forests—Three Levels

- **Populations**
  can reduce or eliminate populations of particular native species
- **Ecosystems**
  can affect the composition and processes of entire forest ecosystems
- **Global Processes**
  can change patterns of forest cover—alter nutrient cycling, and potentially climate

Consequences - Economic

In The United States alone:

- The estimated cost of invasive species is $120 billion per year (Pimentel et al. 2004)
- Invasive plants cover 54 million hectares nationwide
- Affects on watersheds, recreation, timber supply, etc., are poorly estimated but probably enormous

Invasive Species Impacts on Sustainable Development

- Mesquite

Mesquite encroaches on Lake Chad and the surrounding fertile lands

In locations (Cape Verde, Mauritania, Niger) Mesquite is the only source of fuelwood

Invasive Species Impacts on Sustainable Development

- Tamarisk

Annual values lost to Tamarix in Western U.S. (USD mill. 1998)
(Zavaleta, 2000)

Ecosystem Service	Low	High
Irrigation water	38.6	121
Municipal water	26.3	67.8
Hydropower (Colorado River)	15.9	43.7
Flood Control	52.0	52.0
Total	**133**	**285**

Impact of Regulation

- Quarantines restrict trade

Addressing the Problem

Goals

- Prevention
- Early Detection/Rapid Response
- Eradication
- Control
- Restoration

Addressing the Problem

Prevention

Pest risk assessments for wood imports

Log Import Pest Risk Assessments

- **Larch from Siberia and Russian Far East**
- ***Pinus radiata* and Douglas-fir from New Zealand**
- ***Pinus radiata, Nothofagus,* and *Laurelia* from Chile**
- ***Pinus* and *Abies* from Mexico**
- ***Eucalyptus* logs and chips from South America**
- ***Eucalyptus* logs and chips from Australia**

Addressing the Problem

Prevention

Port Entry

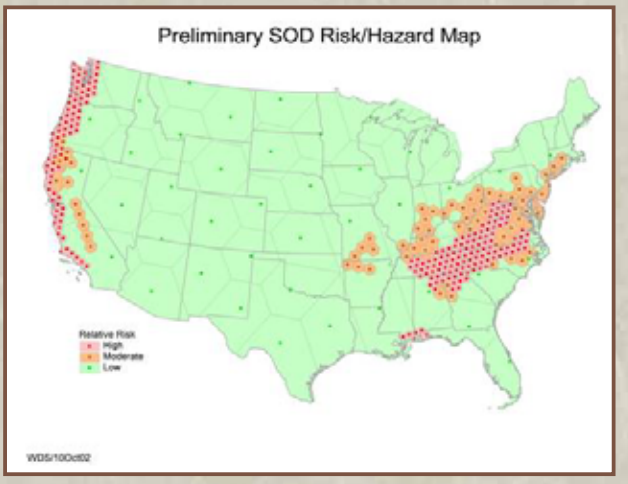
- Asian Gypsy Moth at Russian Ports

Addressing the Problem

Prevention

Risk-based detection

❖Sudden oak death



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Identify potential Threats	*Detect Actual Threats*	*Assess Impacts*	*Respond*
Identify Nature of Specific Threat	Surveillance and Reporting	Evaluate Extent, Severity, Potential Impact	Consult and Coordinate Actions
Identify Mode of Spread	Systematic Detection Surveys	Conduct Regulatory And Quarantine Assessments	Implement Appropriate Treatments
Identify Environmental Influences	Special Detection Surveys	Evaluate and Develop Treatment Options	Monitor Treatment Effectiveness
Identify Vulnerable Ecosystems	Verification and Notification	Assess Potential Response Actions	Restore Affected Areas

Addressing the Problem

Eradication

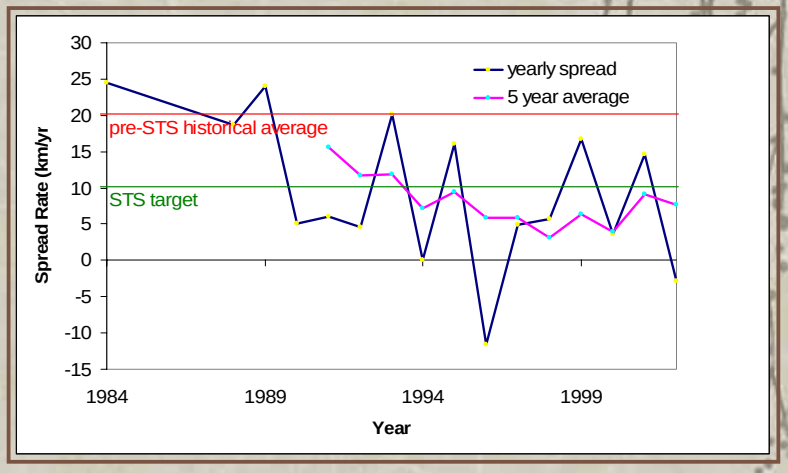
Asian gypsy moth

Addressing the Problem

Control

Slow-the-spread

❖ Gypsy moth

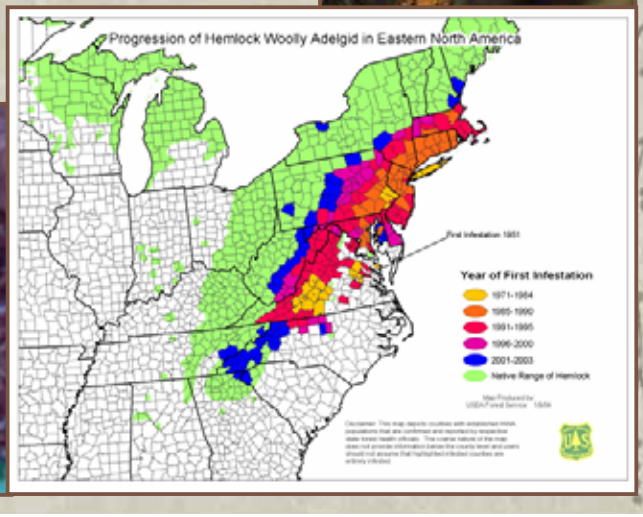


Addressing the Problem

Control

Biological control

- Hemlock wooly adelgid
- Tansy ragwort

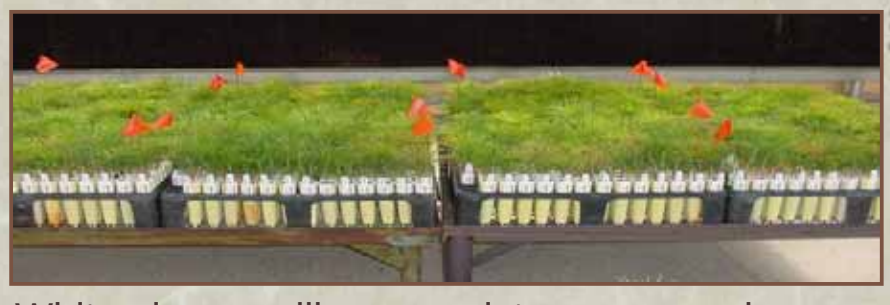


Addressing the Problem

Restoration

Breeding for fungal resistance

- White pine blister rust
- Port-Orford cedar root disease
- Chestnut blight



White pine seedlings—resistance screening

Challenges

Political

- Lack of awareness
- Lack of coordination
- Conflicting policies
- Policy gaps
- Costs

Challenges:

Scientific

- Complexity
- Uncertainty
- Time lags

Final Thoughts

- Tool development
- Focus on prevention--pathways
- Cooperation, cooperation, cooperation