

2008 Oregon Invasive Species Council Statewide Summit

Report to Governor Kulongoski



Oregon Invasive Species Council
Coordination, Prevention, Education, and Collaboration

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Oregon Invasive Species Council

The Oregon Invasive Species Council was established by the Oregon Legislature in 2001 to conduct a coordinated and comprehensive effort to keep invasive species out of Oregon and to eliminate, reduce, or mitigate the impacts of invasive species already established in Oregon.

2008 OISC Council Members

Chair Mark Sytsma—Portland State University

Vice-Chair Bradley Knotts—Oregon Department of Forestry

Dave Bridgwater—USDA Forest Service

Steve Buttrick—The Nature Conservancy

Sam Chan—Oregon Sea Grant

Don Farrar—Gilliam County Weed Department

Chris Guntermann—Oregon Association of Nurseries

Randy Henry—Oregon Marine Board

Marla Harrison—Port of Portland

Dan Hilburn—Oregon Department of Agriculture

Martin Nugent—Oregon Department of Fish and Wildlife

Bill Reynolds—Bureau of Indian Affairs—Warm Springs

Mark Wiegardt—Whiskey Creek Shellfish Hatchery

Lisa DeBruyckere—Oregon Invasive Species Council Coordinator

Tristen Berg—Special Assistant to the Council/ OISC Web Publisher

Robyn Draheim Waldeck—Special Assistant to the Council

Executive Summary

A year-long statewide public awareness and engagement campaign was initiated in Oregon in 2008 to address the increasing threat invasive species pose to Oregon's natural resources, economy, and quality of life, and initiate actions to better protect Oregon. The campaign includes numerous federal, state, and local governments, tribal governments, nonprofit organizations, universities, industry representatives, media, corporations, private foundations, and citizen groups.

As part of the campaign and to help coordinate an effective government response to invasive species in Oregon, the Oregon Invasive Species Council coordinated and hosted a statewide invasive species summit on July 22, 2008 in Salem, Oregon. About 175 people attended the summit, which was designed to bring federal and state agency and industry leaders and legislators together to describe the obstacles to successfully dealing with invasive species in Oregon, and strategies to address those barriers.

Summit attendees described five main concerns relative to invasive species in Oregon, and suggested potential solutions to address those concerns:

Coordination/Cooperation—Oregon needs leadership and communication/cooperation across agencies, enhanced political will to balance strategic and local issues, effective memorandums of understanding with federal agencies, and increased non-governmental participation. Solutions include clearly identifying roles of all agencies, a comprehensive inter-agency strategic plan, an effective Early Detection-Rapid Response Program, an effective outreach program, creation of regional invasive lists, coordinated and efficient tracking of data on invasives, and, where possible, lessening unnecessary duplication of effort by targeting groups or suites of species versus species-specific efforts.

Funding—There is a need for stable, flexible funding as well as emergency funding dedicated to long-term monitoring, coordinated management, strategic control, and enforcement efforts. Solutions include collecting user fees, enforcing existing fines, creating vanity plates, using lottery and Measure 66 dollars, and taxing the vectors (containers, tires, etc.).

Policy—Oregon lacks a comprehensive policy dealing with invasive species, including a lack of focus on pathways and vectors, and checkpoints at ports of entry. There are gaps and overlaps in enforcement jurisdiction. Solutions include stronger laws, clarification of noxious weed listing criteria, a statewide assessment, and legislative committees to deal with invasives.

Public Awareness—Oregonians lack knowledge about invasives and their effect on the environment and the economy. They don't understand their personal responsibility, they fear government involvement, they are confused by the plethora of information on invasives, there is no clear statement of the invasive species problem, and social norms need to shift. Solutions include a sustained multi-media campaign, better distribution of existing materials and use of existing programs, and required curriculum in the schools.

Research and Monitoring— There is no statewide baseline assessment and monitoring system, no transparent and logical risk assessment tool for prioritizing, no integrated database/information sharing system, no forum to share information and research needs, and no comprehensive statewide rapid response strategies for invasive species (note: there are response plans for a few species). Solutions include development of an incident command system to respond to new invasions, professional training on invasive species, creation of a joint federal/state program to identify priorities for research, and development of integrated monitoring programs.

The next steps are to share this report with the Governor, incorporate key strategies into the OISC strategic plan, support key legislative concepts in the 2009 legislative session, and develop and share with the Governor OISC recommendations to enhance support of invasive species efforts throughout Oregon.

1 Background—What Led to the Statewide Summit

Invasive species threaten Oregon's natural resources, economy, and quality of life. Invasive species continue to be introduced as accidental hitchhikers accompanying our trade and travel, and via unintentional relocation by unsuspecting citizens. People have caused our invasive species problem, and people can solve it.

Oregon has many success stories relative to invasive species efforts. The Wildlife Integrity Rules (OAR 635-056), Feral Swine Action Plan,¹ *Spartina* and *Hydrilla* Response Plans,^{2,3} Invasive Species Action Plan,⁴ county weed programs,^{5,6} Ballast Water Management Act of 2007 (SB 644), and Oregon Noxious Weed Strategic Plan⁷ are just a few examples of current and ongoing efforts to address invasive species issues in Oregon. Although progress has been made in the invasive species arena, many acknowledge these efforts fall short of what is necessary to protect Oregon.

In 2007, Oregon Public Broadcasting (OPB) initiated the concept for a statewide awareness and engagement campaign, initially with *The Statesman Journal*, and then with a much broader group of partners that included SOLV, The Nature Conservancy, the Oregon Invasive Species Council, Oregon State University Extension, Oregon Sea Grant, Oregon Departments of Fish and Wildlife, Agriculture, and Forestry, Oregon Marine Board, Oregon Watershed Enhancement Board, Oregon Association of Nurseries, Port of Portland, Bureau of Indian Affairs—Warm Springs, USDA Forest Service, Bureau of Land Management, USDA Plant Protection and Quarantine, US Fish and Wildlife Service, and Portland State University. Many

¹ http://www.oregon.gov/OISC/feral_swine_plan.pdf

² <http://www.clr.pdx.edu/docs/SpartinaPlan5-8.pdf>

³ <http://www.statesmanjournal.com/assets/pdf/J0924081124.PDF>

⁴ http://www.oregon.gov/OISC/docs/pdf/oisc_plan6_05.pdf

⁵ <http://www.co.marion.or.us/PW/ES/salmon/vegplan/native/noxious.htm>

⁶ <http://www.co.deschutes.or.us/index.cfm?objectId=8C99B808-BDBD-57-C1-9BAA666BF374E19B>

⁷ http://www.oregon.gov/ODA/PLANT/WEEDS/plan_contents.shtml

local organizations, including cooperative weed management areas, watershed councils, and soil and water conservation districts became involved, as well as numerous citizens, corporations, and private foundations.

The campaign, called The Silent Invasion, launched on April 22, 2008, with the premiere of OPB's one-hour documentary on invasive species, created to raise public awareness and encourage people take action against invasive species.

Also on April 22, two Websites launched—the Oregon Invasive Species Hotline,⁸ where Oregonians can report and upload photos of suspected invasives and interact with invasive species experts, and The Silent Invasion companion site,⁹ that provides extensive links and information on invasive species in Oregon, including a video archive of stories about invasives in Oregon. The weekly series, Oregon Field Guide (OPB), will continue to focus on invasives species in a number of showings during 2008.

GardenSmart Oregon: A Guide to Non-Invasive Plants was released in April. The booklet identifies 25 of the most threatening invasive plants across Oregon and recommends non-invasive alternative plants for gardeners and landscapers. This free booklet is available statewide in garden centers and other businesses, and from local government agencies. It was developed by the City of Portland, The Nature Conservancy, Oregon Sea Grant, Oregon State University Extension, Oregon Association of Nurseries, and Oregon Public Broadcasting.

Also in April of 2008, over 100,000 OPB members and about 50,000 subscribers to the *Statesman Journal* received a publication on invasive species that provides specific actions people can take to reduce the spread of invasives.

⁸ www.oregoninvasiveshotline.org

⁹ www.opb.org/silentinvasion

SOLV is participating in the campaign by coordinating volunteer weed pulls with over 10,000 Oregonians in 2008. Their Web site¹⁰ includes a statewide calendar of events for invasive vegetation removal projects.

In addition to contributing to *GardenSmart Oregon*, The Nature Conservancy is developing an Early Detection-Rapid Response (EDRR) program in Oregon.¹¹ The project trains volunteers to regularly monitor priority natural areas and identify and report invasives so they can be stopped before they spread.

Oregon State University and Oregon Sea Grant conducted pre-campaign surveys to determine how much Oregonians know about invasive species and what ordinary citizens can do to help prevent their spread. This follows focus group studies conducted by the university last year to gauge awareness and attitudes among key stakeholders in Oregon. Oregon Sea Grant also released a new publication on aquatic invasive species, *On the Lookout for Aquatic Invaders: Identification Guide for the Pacific Northwest*.

The Statesman Journal published a series of in-depth articles on invasive species in Oregon and their economic and ecological impacts. The newspaper has also created a comprehensive Website, www.invasivespeciesoforegon.com, and is producing educational materials for use in classrooms.

The Silent Invasion campaign is receiving national attention because of the collaboration among government, nonprofit, and private entities and its scope.

The Oregon Invasive Species Council is serving as a clearinghouse for information and action to address invasive species statewide, including coordinating the efforts of many groups. The council is a consortium of federal, state, county, and local government agencies, nonprofit organizations, universities, and industry representatives dedicated to a coordinated and comprehensive effort to keep invasive species out of Oregon and to eliminate, reduce, or mitigate the impacts of invasives already present. As the documentary, *The Silent Invasion*, aired across Oregon in numerous communities,

people began asking, “What is government doing to stop invasive species?” The Oregon Invasive Species Council responded to this question by raising funds to coordinate and host a statewide invasive species summit. The goals of the summit were developed with input from federal, state, local, and tribal government leaders, as well as legislators and their staffs:

- *Bring* federal and state agency and industry leaders and legislators (and others contributing to invasive species efforts in Oregon) together to develop a shared understanding of the threat of invasive species to Oregon’s natural resources, economy, and quality of life;
- *Develop* cost-effective, proactive, shared strategies and commitments that adequately fund and implement invasive species control and prevention efforts in Oregon;
- *Develop* a shared understanding of and support for the legislative concepts for the 2009 legislative session that will provide Oregon with adequate protections from invasive species;
- *Prioritize* invasive species efforts in Oregon; and
- *Identify* next steps.



¹⁰ www.solv.org/programs/invasives.asp

¹¹ www.nature.org/oregon

2 The Summit—Bringing People Together for Oregon’s Interests

The Oregon Invasive Species Summit was held on Tuesday, July 22, 2008, at the Northwest Viticulture Center in Salem, Oregon. Summit attendees that pre-registered for the event received a pre-summit packet (see Appendix A) that included a document on the economics of invasive species in Oregon, developed specifically for the summit by Chris Cusack and Michael Harte of Oregon State University; the summit agenda; fact sheets on feral swine and western quagga mussels; an Oregon State University Extension Service publication on Sudden Oak Death; and key draft legislative concepts for the 2009 legislative session that address some of the most significant invasive species concerns identified to date by the Oregon Invasive Species Council.

The agenda for the summit was structured to achieve the summit goals outlined above. Most of the morning session was devoted to short presentations by local government (Portland—Commissioner Sam Adams), state government (Dan Hilburn—Oregon Department of Agriculture and Evan Freeman—Utah Division of Wildlife Resources), federal government (Lori Williams—National Invasive Species Council, Washington, DC), and global (John Randall—The Nature Conservancy, California) representatives, describing the impacts and challenges of managing invasive species. The pre-summit materials and opening session were designed to meet the first objective on the agenda—shared understanding and awareness.

The latter portion of the agenda focused on achieving the remaining objectives—identifying the problem, developing solutions, and garnering support for 2009 legislative concepts. The target group was local, state, tribal, and federal government officials as well as legislators and their staffs. A total of eight facilitated sessions with eight people in each session (65 participants and 16 facilitators) discussed and responded to two questions:

- **Question #1:** *What are the most significant obstacles Oregon faces in addressing invasive species? Develop a priority list.*
- **Question #2:** *What prioritized strategies/actions could address these obstacles and the ways we currently approach invasive species monitoring, prevention, and control efforts in Oregon?*

A total of 175 people attended the event (see Appendix B). The 110 people that were not participating in facilitated sessions were given the opportunity to listen to the facilitated discussions, provide comments to the entire group of 175 people during the last segment of the agenda, submit written comments to incorporate into this report, and edit this report.



3 The Summit Results

The following includes the results of the facilitated sessions, organized by question and then theme (a complete listing of the raw data obtained from each facilitated session is available in Appendix C).

- Coordination/Cooperation
- Funding
- Policy
- Public Awareness
- Research and Monitoring

Coordination/Cooperation

The Issues

Groups highlighted the need for improved communication/coordination at the intra-agency, interagency, and regional levels. There is no one authority/responsible for coordination or information sharing, nor is there a legislative mandate or funding for coordination/cooperation. One group suggested “political will” was lacking to create such a holistic structure that balances both strategic and local approaches across agencies, and that even if a strategic outreach plan were developed, the state lacks the capacity to implement such a plan.

It was suggested there is lack of coordination within agencies, with “isolated personnel tackling invasive species issues.” Although several agencies have “some authority,” there is no central leader to guide resource allocation (personnel and operational dollars) for prioritized invasive species monitoring, management, and control efforts. Such efforts require coordination, consistent enforcement and



Western Tanager. Photo by Portland Audubon Society.



Pronghorn antelope. Photo by US Fish and Wildlife Service.



Yaquina Head Lighthouse. Photo by Lisa DeBruyckere.



Steens Mountain. Photo by Oregon Natural Desert Association.

Oregon's native landscapes and wildlife are threatened . . .

penalties, clear leadership, a mechanism for local implementation, increased non-governmental participation, and memorandums of understanding among federal and state agencies.

Several groups commented on the tendency to work on invasive species within specific taxa or habitats (e.g., terrestrial weed programs; state aquatic invasive species management plan; individual species projects), creating opportunities for unnecessary duplication as well as “species fatigue” within outreach target audiences.

The Solutions

Groups described the need to clarify roles and responsibilities of agencies and organizations relative to invasive species monitoring, management, control, and enforcement, and suggested a comprehensive inter-agency strategy to develop a 5-year plan, create an effective Early Detection-Rapid Response program, establish priorities, develop a policy road map, create and implement an effective education and outreach program, and identify resources. It was advised that any program in Oregon should complement national standards and that existing programs can serve as a model—there’s no need to reinvent the wheel.

Some suggested establishing a lead agency, perhaps using the OISC to establish the infrastructure,

framework, and priorities for implementation by agencies and groups. One group suggested the OISC could serve as the fiscal agent to funnel funding to implement actions. It was suggested a statewide strategic plan be developed, and that people should be added to a task force/subcommittee/advisory committee to fully flesh out the details of a statewide plan.

One group suggested the need for regional weed lists to enhance coordination on a more local level, and that industry should be involved in the development of those lists. Another suggested the strength of atypical partnerships, such as The Nature Conservancy, Oregon Cattleman’s Association, and industry partners, such as Oregon Association of Nurseries, approaching the legislature in unison on invasive species management issues. Cooperative Weed Management Areas (CWMA) and watershed councils could be a mechanism for working across boundaries.

It was suggested that the Oregon Natural Heritage Program conduct invasives inventories as part of their biological inventories. The inventories could build on the Oregon Department of Fish and Wildlife (ODFW) Conservation Strategy,¹² which includes ecoregional lists of priority invasive species (those here, and ones not here yet) and Conservation Opportunity Areas. The inventories could be used to help prioritize species and locations for

¹² <http://www.dfw.state.or.us/conservationstrategy/contents.asp>

... by invasive species



Kudzu in northwest Oregon. Photo by Tom Forney.



American Bullfrog.
Photo by Patricia Michaels.



Scotch Broom. Photo by Eric Coombs.

targeted invasives work in the future. A database of management actions, similar to ODFW and Bureau of Land Management programs, could be included. Weedmapper¹³ and Wildlife Viewer¹⁴ could be updated more frequently, expanded to map invasives, and provide more specific locations for local weed managers, and the OISC could obtain input from the cooperative weed management areas and watershed councils/industry to help integrate management priorities. It was also suggested that the Western Plant Diagnostic Network¹⁵ at Oregon State University could be expanded to include the broader list of all invasive species—mammals, birds, reptiles, amphibians, and insects.

Funding

The Issues

Groups discussed the need for stable, flexible funding as well as emergency funding to address long-term monitoring, coordinated management, strategic control, and enforcement efforts. Groups noted the need for a statewide strategic plan that prioritizes strategies—to allocate and optimize finite resources, focus on achievable problems, implement a state-led Early Detection-Rapid Response program, and differentiate between problems that are better dealt with at the state versus local levels. It was suggested that existing funding restrictions limit staffing and outreach efforts and result in over-reliance on volunteers and competition for resources in programs that are already stretched thin—as one group said, “the plate’s too full.” It was noted that invasive species control is a low priority for counties, particularly those counties in western Oregon that have experienced reduced timber payments from federal-managed forests. Another group expressed support for funding county weed boards.

Groups suggested a need to better identify external sources for supplemental funding, but noted there is a lack of established priorities to effectively seek funding and support for invasive species issues. Some perceived a “lack of legislative champions”

relative to invasive species issues, while others acknowledged the achievements of the past, such as the unanimous passing of the ballast water bill during the 2007 legislative session.

The Solutions

Groups discussed funding solutions by describing specific sources of funding, or proposing the development of committees or groups to create more specific funding strategies—but both supported the need for stable, dedicated, coordinated, strategic, long-term, flexible and emergency funding.

Groups suggested collecting user fees via a public service charge, such as an added fee on electric bills, enforcing existing fines, vanity plates, using lottery and Measure 66 dollars, and taxing the vectors—shipping containers, tires, boater registration fees, ATV registration, herbicide enforcement fees, and a pet trade tax. A cost-saving measure included using inexpensive labor, such as college students and Americorps for monitoring and inventory work.

Groups suggested developing a strategic plan to better use existing money, developing a mechanism/authority for emergency fund management, funding to continue the hotline Website management, a funding source that is less restrictive than the current capital funds vs. operational funds dilemma that ODA currently experiences, a committee to develop funding strategies, and funding for outreach and education grants.

One group also discussed how some solutions to problems are better tackled at higher levels of government, like the state or federal agencies, whereas others are better tackled at the local level. This should be considered as Oregon develops programs and secures funding for addressing some of the barriers to effective invasive species management. For example, municipalities need statewide assistance with developing new policy, securing local program funding, setting management priorities, developing regional lists, developing overarching reporting and tracking systems (ones that could be used locally), and developing outreach/educational materials. At the local level, however,

¹³ <http://www.weedmapper.org>

¹⁴ <http://www.oregonexplorer.info/Wildlife/WildlifeViewer/>

¹⁵ <http://www.wpdn.org/index.php>

they are effective at implementing control efforts, implementing education and outreach, tracking and reporting control efforts, and conducting inventories.

Policy

The Issues

It was noted that Oregon lacks a comprehensive policy dealing with invasive species—several groups commented on the need for a legislative mandate, greater political will, and enhanced recognition on the part of the legislature that there is a problem. Oregon relies on “after-the-fact” regulations, some existing laws may actually serve as barriers, and lack of market considerations in regulations hampers effectiveness. One group mentioned “a lack of checkpoints at ports,” although there are customs and inspection stations at all ports. It was noted that “poster child” invasive species can serve as both a barrier and an opportunity, and that there is a lack of focus on pathways/vectors (i.e., Internet sales jurisdiction and/or enforcement). Groups commented on the overlapping enforcement jurisdictions, and gaps, or areas where jurisdiction has not been identified. “Boundary issues” are a result of geographical and political issues, and are compounded by conflicting interests, priorities, and authorities.

The Solutions

It was suggested that Oregon needs “real laws with real enforcement teeth” and authority—i.e., because there is limited public funding for implementation of control efforts, Oregon needs a noxious weed law similar to Washington and Idaho that requires property owners to remove invasive plants from their property—and that the legislature should be used to review, clarify, and define authorities. Noxious weed listing criteria should be clarified. Several groups suggested the creation of an invasive species “czar,” a policy staffer within the Governor’s office, while another group suggested that different groups may be the best leaders under certain circumstances. The need to keep leadership interested and engaged in

invasive species issues was expressed. A statewide assessment that would help define legislative authority and gaps, and define jurisdiction for pathways/vectors, was deemed important. One group suggested the creation of legislative committees on invasive species issues, because these generally lead to policy. It was also noted that any actions should address crises while a pro-active framework is built.

One group offered three different perspectives or views on developing a policy model:

- The creation of an invasive species “czar” as a clear authority in the state.
- The Governor distributing an executive order to agencies to set aside funds and resources in the short term to eradicate and prevent invasive species—in the long term, a task force (the OISC) would develop a statewide plan for funding and action, with the OISC obtaining funding authority.
- Require agencies to work together like the “Oregon Plan for Salmon and Watersheds” model, with dedicated lottery funds.

Policy issues should complement national initiatives and should be conducted on different scales—from the West Coast Governor’s agreement, to a local watershed council, to someone’s backyard.

Public Awareness

The Issues

Groups described numerous issues associated with public awareness and outreach, primarily focusing on the need for clear messages to specific target audiences. It was acknowledged that within the public exists “entrenched constituencies,” both “knowing and unknowing,”—i.e., some people like or value certain invasive species—and that in general, the public lacks knowledge about invasive species and their effect on the environment. In particular:

- invasive species are not recognized as having local impacts;

- people don't understand the liability and costs of invasive species,
- people don't perceive that their behavior is part of the problem and thus aren't willing to take ownership of the issue;
- people fear government involvement;
- people are confused because of the proliferation of lists and sources of information about invasive species;
- audiences are segmented—i.e., boaters, anglers, hunters, gardeners; and
- Oregonians live in a large, diverse state with region-specific invasive species priorities.

It was noted that a clear statement of the invasive species problem does not exist—in some ways contributing to a lack of sense of urgency—and that lack of common definitions adds a layer of complexity to the issue. The public receives mixed confusing messages instead of definitive success stories that include clear, achievable, prioritized goals that focus on important areas and habitats that warrant protection in the immediate future, and that quantify the “do nothing” alternative, i.e., the impacts of invasive species—economic, environmental, social, etc.

One group asked, “Whose job is it?” while another commented on the need for a spokesperson. It was suggested that perhaps a social paradigm shift is necessary to obtain social acceptance of procedural activities to deal with invasive species—another group described this as a shift in social norms, where the public would take ownership and responsibility for invasive species prevention and control. Several groups commented that people need to see the sense of urgency reflected in leadership.

One group noted the importance of creating citizen-based tools to encourage monitoring and prevention.

The Solutions

Groups suggested developing a sustained multi-media effort with specific, but broad, target audiences that:

- summarizes the economic impact of invasive species;
- distributes the Oregon Public Broadcasting documentary;
- focuses on individual legislator's districts;
- resolves the issue of mixed and confusing messages;
- includes an Invasive Species Day at the Legislature;
- acknowledges there is no one solution; and
- incorporates messages the public can relate to in a systematic way, such as watershed health, or in a context that can be understood, such as power availability and fishing.

It was suggested that there be better distribution of existing materials, and sharing and use of available curriculum (one group suggested natural history curriculum be mandated in Oregon schools so that children develop an appreciation for native flora and fauna). Existing programs, such as Master Gardeners,¹⁶ can be used to inform the public, and the proliferation of invasive species “lists” on numerous Websites should be coordinated and reduced to one statewide list and regional lists—criteria used to list species should be transparent and promoted as well as corresponding stewardship tools. The positive aspects of state programs should be shared and acknowledged, and the structure of invasive species monitoring, management, and control efforts should be clearly explained to the public. There should be a “public rapid response” to invasive species sightings: as one group stated, “See it, get proper identification, pull it, kill it.” Another group noted that because many members of the public cannot properly identify invasive species, they should be trained to seek professional identification for suspected invasives.

¹⁶ <http://extension.oregonstate.edu/mg/>

Research and Monitoring

The Issues

Groups described the need for:

- a statewide baseline assessment and monitoring system (it was suggested there may be an over-reliance on volunteers for data collection);
- a transparent and logical risk assessment tool for prioritizing;
- an integrated database/information sharing system;
- basic and applied science;
- best management practices;
- a forum to share information and research needs, and science and best management practices;
- formulation of rapid response strategies for invasive species;
- a transparent and logical risk assessment tool for prioritizing;
- coordinated research in Oregon and regionally; and
- research that evaluates the potential impacts of invasives and development of control measures to eradicate or contain them.

It was also noted there is conflict over control options, i.e., use of pesticides, herbicides, biocontrols, and lethal methods.

The Solutions

An incident command/fire model could be used to develop an “Early Detection-Rapid Response Strike Team” or “Virtual Action Team” to deal with acute invasive species problems and an improved ability to predict impacts. The Team would respond to new invasive species introductions—this would include formalized interagency agreements to facilitate

Feral Swine are wreaking havoc in states where they have become established, destroying riparian areas and other important native habitats. Photo by Oregon Department of Agriculture.



Brought to the United States from Eurasia at the turn of the 20th century, Leafy Spurge is one of the West's worst weed species. Photo by Dan Sharratt.

Purple Starthistle displaces valuable forage species, impacting agriculture and native wildlife. Photo by Tom Forney.



Eurasian Watermilfoil can form dense canopies on the surface of lakes. Photo by Robert L. Johnson of Cornell University



A native of Australia, the Light Brown Apple Moth was recently discovered in California. This insect poses a major threat to Oregon's agriculture industry, particularly fruit orchards. Photo by California Department of Food and Agriculture.

rapid response, and an agency fund pool to facilitate action. It was suggested the Team would exist at the Governor’s Cabinet level, with the OISC serving as the Board. It was suggested that the Puget Sound Partnership could serve as a model, however, others noted it is important that a lead agency be designated for implementation of this model.

One group suggested developing local sources for biological supplies will reduce costs and reinforce the goals of invasive species management (versus, for example, introducing another non-native as a biological control), however, it was pointed out that classical biological control is the re-association of natural enemies of the pest invasive, thus using native local sources may not be feasible.

Two groups suggested the need for professional training for invasive species issues. One group suggested bringing expert knowledge together via “New Pest Response Guidelines.” Another group noted the Institute for Natural Resources¹⁷ could serve as facilitator for Center of Excellence Networks for sharing through the university system.

One group mentioned creating a joint federal/state program to identify priorities for research. The program could be funded through both competitive and invited proposals based on priorities. This same group recommended expansion of the Oregon Department of Agriculture Noxious Weed Grant Program to include funding research and monitoring.

Another group recommended developing integrated monitoring programs.

¹⁷ <http://inr.oregonstate.edu/>



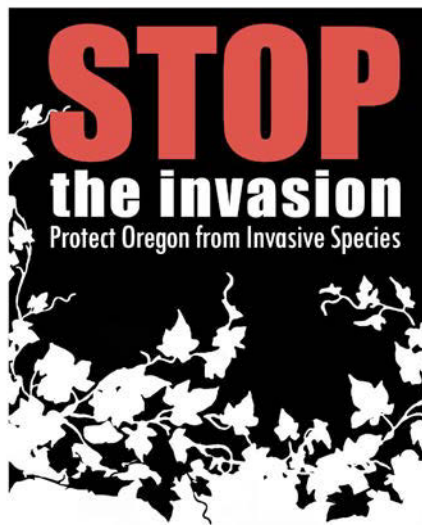
4 The Next Steps

At the conclusion of the summit, the next steps in the process were described. This included:

- production of this report, which all summit attendees would have an opportunity to comment on and edit;
- presentation of this report to the Governor;
- incorporation of key strategies into the Oregon Invasive Species Council strategic plan and business plan;
- support of key legislative concepts in the 2009 legislative session that protect Oregon from the introduction of new species and the spread and eradication of existing species; and
- using input from the summit to develop

and share with the Governor OISC recommendations to enhance support of invasive species efforts throughout Oregon.





OREGON INVASIVE SPECIES COUNCIL

Oregon Invasive Species Council, Oregon Department of Agriculture Plant Division, 635 Capitol St NE, Salem, OR 97301-2532
www.oregoninvasiveshotline.org



OREGON INVASIVE SPECIES COUNCIL

Coordination, Prevention, Education, Collaboration

Oregon Invasive Species Summit
(hosted by the Oregon Invasive Species Council)

July 22, 2008

Northwest Viticulture Center—Chemeketa Community College

215 Doaks Ferry Road NW

8:30 a.m.–4:30 p.m.

Agenda

Meeting Objectives:

- *Bring federal and state agency and industry leaders and legislators (and others contributing to invasive species efforts in Oregon) together to develop a shared understanding of the threat of invasive species to Oregon’s natural resources, economy, and quality of life;*
- *Develop cost-effective, proactive, shared strategies and commitments that adequately fund and implement invasive species control and prevention efforts in Oregon;*
- *Develop a shared understanding of and support for the legislative concepts for the 2009 legislative session that will provide Oregon with adequate protections from invasive species;*
- *Prioritize invasive species efforts in Oregon; and*
- *Identify next steps.*

Expected Work Product:

- *A report to the Governor that describes the actions, strategies, and recommendations developed by summit participants to deal with invasive species in Oregon.*

8:15	Gather—Coffee
8:30 – 8:40	<u>Agenda for the Summit</u> <ul style="list-style-type: none">• Review today’s agenda; other housekeeping details — <i>Lisa A. DeBruyckere, OISC Coordinator</i>
8:40 – 8:50	<u>Welcome and Introductions</u> <ul style="list-style-type: none">• Welcome and Introduction of Plenary Session — <i>Mark D. Sytsma, Oregon Invasive Species Council (OISC) Chair</i>
8:50 – 9:00	<u>Governor’s Office Remarks</u>

- Perspectives of the Governor's office — *Mike Carrier, Governor's Natural Resource Policy Director*

9:00 – 10:00

Invasive Species — International, National, State, and Local Perspectives

- Background information and discussion on the state of invasive species at the international, national, state, and local levels
 - Objective: Provide an overview of the challenges and opportunities to effectively manage invasive species as well as the short-term and long-term key priority issues.
 - *Sam Adams*—Portland City Commissioner, Portland, Oregon (Local government perspective)
 - *Evan Freeman*—Invasive Species Biologist, Utah Department of Wildlife Resources (State perspective)
 - *Dan Hilburn*—Administrator of Plant Division, Oregon Department of Agriculture, Salem, OR—**Oregon vs. Invasive Species, Are We Winning, Losing, or Holding Our Own?**

10:00 – 10:20

BREAK

10:20 – 11:00

Continuation of Morning Session

- *Lori Williams*—Executive Director of the National Invasive Species Council, Washington, DC (National perspective)
- *John Randall*—Global Invasive Species Team Lead, The Nature Conservancy (International perspective)

11:00 – 11:15

Summary of key State of the State Issues and Initiate Breakout Sessions

- Summarize plenary discussion key points and packet materials — *Lisa DeBruyckere, OISC Coordinator*
- Create breakout sessions involving summit invitees
 - Objective: Summit invitees gather in small groups to develop shared solutions to address the barriers to effectively managing invasive species in Oregon.
 - The OISC has identified the following barriers to effectively managing invasive species in Oregon:
 - After-the-fact regulations and regulatory obstacles
 - Lack of knowledge and awareness
 - Competing priorities, inadequate funding, and non-existent emergency funding
 - A lack of infrastructure to prioritize, coordinate, collaborate, and fund invasive species efforts
 - **Question #1: What are the most significant obstacles Oregon faces in**

addressing invasive species? Develop a priority list using the bulleted list above and/or additional perspectives.

- **Question #2:** *What prioritized strategies/actions could address these obstacles and the ways we currently approach invasive species monitoring, prevention, and control efforts in Oregon?*

11:15 – 12:15

Breakout Session #1 (address question 1)

- Facilitate small group discussions to address barriers — *Summit Facilitators*

12:15 – 1:30

LUNCH (*Case studies on successful invasive species efforts in the U.S.*)

Guest speakers:

Charlie Stenvall—Refuge Manager, Willapa Bay National Wildlife Refuge, Washington (*Spartina*)

Everett Hansen—Professor, Department of Botany and Plant Pathology, Oregon State University

Lars Anderson—Lead Scientist, US Dept. of Agriculture/ Agricultural Research Service, Exotic and Invasive Weed Research Laboratory (*Caulerpa*)

1:30 – 2:45

Breakout Session #2 (address question 2)

- Facilitate small group discussions to address barriers — *Summit Facilitators*

2:45 – 3:00

BREAK

3:00 – 4:20

Summary and Discussion of Breakout Session Solutions and Recommendations

- Summarize and lead discussion of the results of the breakout sessions — *Lisa DeBruyckere, OISC Coordinator*
 - Objective: Ensure there is a shared understanding and support for suggested shared solutions and recommendations to effectively manage invasive species in Oregon.

4:20 – 4:30

Next Steps

- Describe and obtain concurrence on the next steps (short term and long term) needed to implement an effective strategy for managing invasive species in Oregon — *Mark D. Sytsma, OISC Chair*

4:30

Adjourn

The Economics of Invasive Species

***Prepared for the Oregon Invasive
Species Council***

July 2008

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The Economics of Invasive Species

Summary

- The prevention, eradication and control of invasive species is an economic and policy issue and has less to do with biology and ecology than many people involved in the management natural resources realize.
- Invasive species were introduced into the United States because of trade, commerce and the fulfillment of cultural needs. Decisions about agricultural production, conversion of land from forest to fields to towns, the growth of trade and tourism and the choice of introduced species for food production, garden ornamentals and for hunting and fishing are among the fundamental economic drivers of the invasive species problem.
- Economics provides us with many of the tools we need to understand the drivers of the invasive species problem and inform managers and policy-makers about the costs of invasive species and the costs and benefits of different prevention, eradication and control measures.
- Studies have been carried out to estimate the economic effects of invasive species and their management on natural resources. These have been particularly focused on forest or agricultural production losses and control costs but the economic impacts on ecosystem functioning and human health have been less well studied at both state and national levels. Examples of estimates of the annual cost of invasive species in the USA and Oregon (in 2007 dollars) include:

USA general estimate	Total direct and indirect use impacts	\$140 billion/year
Noxious weeds (21 species in Oregon)	Production losses, fire damage, control costs	\$120 million/year
Zebra mussels (Oregon) (projected)	Projected control costs to 13 hydropower facilities	\$25 million/year
Sudden Oak Death (Oregon)	Nursery production losses if established	\$79-\$304 million/year
	Control costs of current outbreak	\$7 million/year
Invasive Plants (Portland, Oregon)	Complete removal and revegetation with native species over five year period	\$10-31 million/year

- A much wider role for economics is needed that goes beyond financial analyses of agricultural or timber production losses and control costs and embraces measures of the impact of invasive species on total economic value and the consequences of the loss or impairment of ecosystem services for the economic well-being of Oregon.
- Early detection and rapid response (EDRR) and prevention are among the most cost efficient and effective ways reducing the costs of invasive species. Education is a primary process driving EDRR and prevention. Enhanced education of both the

public, government agencies, industry and non-governmental organizations, is needed to strengthen all links in the IS management chain.

Introduction

Approximately 50,000¹ non-indigenous species (NIS) have been introduced into the country as a result of human commerce, trade and movement. Some have been introduced intentionally, such as those used as livestock, pets, food crops, and ornamental plants. Other species have been introduced unintentionally, such as the zebra mussel, which hitchhikes in the ballast water of ocean-going ships.

Once introduced, many NIS fail to thrive in their new environment. Other species thrive and have positive or at least no adverse effects on the ecosystem into which they are introduced. Indeed, NIS provide more than 98% of the U.S. food system generating a value of over \$874 billion per year¹. However, some NIS become “invasive species” (IS), which- according to the Convention on Biological Diversity² (CBD), are: “alien species whose introduction and spread threaten ecosystems, habitats, or species with socio-cultural, economic and/or environmental harm and/or harm to human health”. According to the CBD, invasive species are one of the leading causes of loss of natural biodiversity.

The means or routes by which species are introduced into new ecosystems are “pathways” or “vectors”. Examples of these vectors are the intentional release of species (such as brook trout introduced into Cascade lakes to augment fishing opportunities), organisms which arrive lodged in the bodies of their hosts, such as livestock or fresh fruit and vegetable produce, species that arrive in packing material and unintentionally introduced species such as the Zebra mussel, which are transported in the ballast water of ocean-going ships. What all these pathways have in common is that they are the direct result of the global and regional trade, transport of goods and people and the cultural needs associated with people. With increasingly open national economies, and a large increase in the volume of global trade in the last 50 years, the numbers of IS in the U.S. are rising.

While the global transport of goods and people is the primary vector for the introduction of IS, and ecological factors such as a lack of controlling natural enemies and a lack of effective predators explain their propagation in new ecosystems, the factors that allow them to become established and thrive in new environments is also readily explained by economics. Property rights, trade rules, and prices affect people’s decisions on land use, on the use of certain species in consumption and production, and on the global and regional movement of goods and people³. While global trade is the main vector for

¹ Pimentel D, Zuniga R, Morrison D. (2005). Update on the environmental and economic costs associated with alien-invasive species in the United States. *Ecological Economics* 52 pp. 273-288.

² online at <http://www.cbd.int/>

³ Lovell S, Stone, S, Fernandez L. (2006). The economic impacts of aquatic invasive species: A review of the literature. *Agricultural and Resource Economics Review* 35(1) pp. 195-208.

biological invasions, regional trade (such as between the U.S., Mexico and Canada, or between states in the U.S.) exacerbates these effects.

Biological invasions are a classic “Econ 101” example of a negative externality arising from people’s economic decisions. Negative externalities are simply the uncompensated third party costs arising from a particular decision or action. The risks of biological invasions are endogenous, in that they are affected by how countries protect themselves from IS, and how they react to them after they occur⁴. In these respects, IS management is more of an economic and management problem than a biological or ecological one. Indeed, economic studies are increasingly being used to justify measures against IS.

“Economics is much more than just a method for calculating costs. It is a framework for understanding the complex causal interactions between human behavior and natural processes, and for finding institutional and behavioral solutions to seemingly intractable environmental problems⁵.”

Invasive species management is also a “weakest link” public good. It is non-exclusive, meaning incentives exist to take a “free ride” on the efforts of others and shoulder less than a fair share of the costs of control. Also the collective benefits of IS management are orders of magnitude above what they are to the individuals or regions receiving them further reducing the incentive for individual action. IS management is only as effective as the weakest link in the chain. For example, five ports on the west coast may have best practice biosecurity measures in place, but a sixth port may put in place the minimum biosecurity practices required by law. This “weakest link” can result in IS introductions into the region despite the very best effort of the other five ports.

Invasive Species Management and Economics

A common management goal for IS, such as that outlined by Bio-Security New Zealand⁶ is: “the exclusion, eradication, or effective management of risks posed by weeds, pests, and diseases to the economy, environment, and human health”. Economics can be used to help meet this goal by providing:

- Before the fact evaluation, prioritization, and selection of prevention, eradication, and control measures.
- After the fact evaluation of measures to assess their efficiency and effectiveness.
- Impact assessments such as an evaluation of the costs of damage from IS, and the costs of measures employed to prevent, controlling or managing the damage.
- An understanding of the relationship between human behavior and the prevention, eradication and control of invasive species.

⁴ Jensen R. “Economic policy for invasive species” online at:<http://www.nd.edu/~rjensen1/workingpapers/InvasiveSpecies.pdf>

⁵ Perrings C, Williamson M, Barbier E, DeFlino D, Dalmazzone S, Shogren J, Simmons P, and Wtkinson A. (2002) Biological invasion risks and the public good: an economic perspective. *Conservation Ecology* 6(1): 1.

⁶ Online at: <http://www.biosecurity.govt.nz/>

The goal of Oregon's invasive species action plan⁷ is to "facilitate efforts to keep invasive species out of the state, find invasions before they establish permanent footholds and do whatever it takes to eradicate incipient populations of undesirable species". This focus on early detection and rapid response has paid dividends and is likely to continue to do so. The costs of controlling invasive species rise rapidly as the species gains a stronger foothold in the ecosystem. After the establishment phase, eradication may no longer be a possibility, and damage mitigation and control may be the only feasible policy responses.

Case I: eBay and Gypsy Moths in Oregon

Gypsy moths (*Lymantria dispar*) are one of North America's most devastating pests. When they reach high population densities they can cause extensive defoliation of trees and shrubs. They were originally introduced into the eastern U.S. in 1869 as part of research for the silk-producing industry; they subsequently escaped, and wide-spread eradication efforts were made beginning as early as 1890. Millions of acres in the eastern U.S. have been defoliated by these creatures to date.

Gypsy moths were largely confined to the eastern U.S., but in 1983, 3 gypsy moths were discovered near the town of Lowell, Oregon. An extensive trapping program was implemented and over 1,900 were caught in the area in 1984. The Oregon Department of Agriculture (ODA) implemented aerial spraying of a biological insecticide in 1985 in an effort to eradicate the moth. Nearly a quarter of a million acres were treated, and spraying continued in 1986. In 1987, extensive trapping revealed no gypsy moths in the area and the pest was deemed eradicated. Since that time ODA has continued monitoring for the moths, deploying over 18,000 traps statewide. Although a few have been caught every year, and limited spraying continues to be carried out, the species has been effectively controlled.

Interestingly, in 2006, 66 moths were caught in Oregon, most of them in Bend, in central Oregon. Further investigation found that this new infestation arrived from Connecticut in a 1967 Chevy purchased through the internet auction site eBay! This illustrates the difficult task that faces policy makers trying to control invasive species. Control of an IS does not end with its eradication. Constant monitoring is required, which has become a routine, albeit challenging task for state agencies dealing with the problem.

Oregon Department of Agriculture http://www.oregon.gov/ODA/PLANT/plant_ann_rep06_ippm_part2.shtml

Economic Impacts of Invasive Species

Ecosystems provide humans with goods and services, each of which can be assigned (often arbitrarily) a value. Many studies have been carried out which highlight the detrimental effect of IS on natural ecosystems, and therefore their value. Use-values (such as the value of food production or the value of recreation activities in natural areas) can be measured and form the basis for the vast majority of studies. Non-use values (such as existence value i.e. the value of knowing that natural ecosystem exist is there, or

⁷ Online at: http://www.oregon.gov/OISC/docs/pdf/oisc_plan6_05.pdf

bequest value i.e. the value of leaving a natural and functional ecosystem to future generations) go beyond financial analyses and are therefore more difficult to quantify. A loss of these values does, however, impose a loss of wellbeing to individuals and society and should be taken into account when making policy decisions. The concept of total economic value and examples of ecosystem services are shown in Figure 1 and Table 1.

Figure 1: Components of Total Economic Value⁸

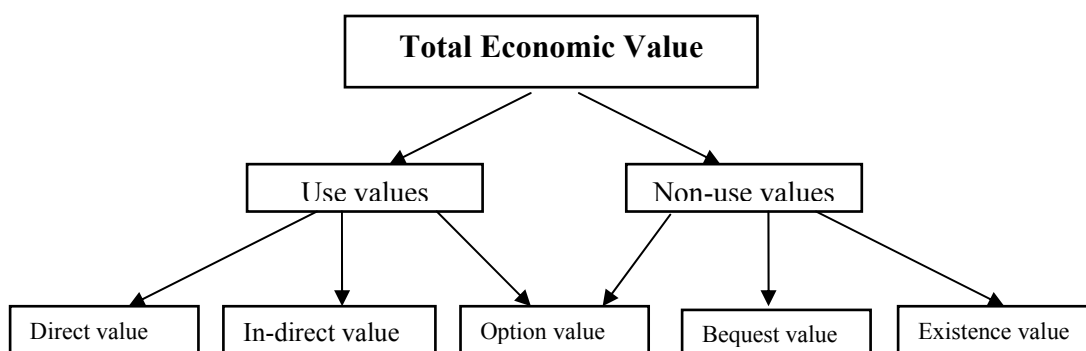


Table 1: Examples of various ecosystem services, and types of values provided

Service	Examples	Type of value provided
Provisioning	Food production	direct-use value
	Ingredients for pharmaceutical and industrial manufacturing	direct-use value, option value (use value)
Regulating	Climate regulation	indirect-use value
	Carbon sequestration	indirect-use value
	Waste decomposition	indirect-use value
	Nutrient dispersal and cycling	indirect-use value
Supporting	Habitat for endangered species	existence value
Cultural	Intellectual and spiritual inspiration	non-use value
	Recreation	direct-use value, non-use value
	Scientific discovery	direct-use value, option value
Preserving	Genetic diversity for future options, insurance	option value, bequest value, existence value

⁸ Modified from: Born W, Rauschmayer F, Brauer I. (2005). Economic evaluation of biological invasions- a survey. *Ecological Economics* 55 pp. 321-336.

Subsidies to producers and the inclusion of IS control costs in the calculation of economic growth (and hence total economic well-being) may distort the accounting of true costs of dealing with invasive species. However, attempts have been made to quantify these impacts at both a state and national level.

To date there have been two major nationwide studies of the costs of impacts from invasive species:

- The first, from the office of technology assessment⁹ found that costs associated with 79 harmful species over an 85-year time period amounted to over \$137 billion.
- A more recent study¹ estimated the costs associated with a much wider group of IS to be in the region of \$140 billion per year. Both of these estimates were based on direct and indirect-use values (such as damage and costs of control) but did not take into account non-use values.

There were significant differences in the way the two studies were conducted but they both illustrate the difficulty in quantifying the impacts of IS at a national level. These studies also suggest that the overall magnitude of annual economic effects exceeds the federally-defined threshold of \$100 million per year for “major” economic impacts.

Case II: Benefits of Biological Control of Tansy Ragwort in Oregon

Tansy ragwort (*Senecio jacobaea*) was introduced into the U.S. from Europe for its medicinal qualities. It has become widely distributed throughout Oregon and other Western States, achieving high densities on valuable pastures. The plant produces pyrrolizidine alkaloids that are toxic to cattle and other livestock, causing millions of dollars of losses from livestock deaths per year along with reducing pastureland productivity.

The state of Oregon designates the tansy ragwort as “noxious” and has implemented a biological control program for it. Cinnabar moths and ragwort flea beetles, which effectively attack the seeds, leaves, and roots of the tansy ragwort, were released. The biological control program provides an estimated annual benefit of \$6 million, with a minimum benefit to cost ratio of 13:1. The annual benefit includes \$4.4 million in reduced livestock deaths, \$1.52 million in increased productivity of pastures, and \$1.02 million in reduced herbicide use.

Radtke H and Davis S. (2000). Economic analysis of containment programs, damages, and production losses from noxious weeds in Oregon. Report prepared for Oregon Department of Agriculture, plant division, noxious weed control program.

There have been many studies on the impacts of individual invasive species in localized settings (Table 2). Most of these studies attempt to value existing invasions, and disregard the value of preventing future invasions, which might be the most effective

⁹ OTA (1993) Harmful non-indigenous species in the United States. OTA F-565, Washington, D.C.: U.S. Congress Office of Technology Assessment, U.S. Government Printing Office.

policy tool available. They also focus on the loss of provisioning services, and the corresponding direct-use economic impacts, which are reflected in business or financial

Case III: Potential Cost of Zebra Mussels to Hydropower Facilities on the Columbia

The Zebra mussel (*Dreissena polymorpha*) was introduced into the great lakes via ballast water discharged by ships arriving from Europe. Zebra mussels form large, dense populations that may reduce available food and oxygen for native species, along with completely choking out native mussel and clam species. They colonize and clog water intake pipes, water filtration equipment, and power generating facilities, causing negative financial impacts of over \$1 billion per year¹.

They have since spread into most of the aquatic ecosystems in the eastern U.S., and are expected to invade most freshwater ecosystems in the country. Because this species has gained a strong foothold over such a wide geographic area, eradication of this species is now thought to be impossible. They have not yet been detected in Oregon, but, state agencies are on high alert, and studies on the potential impacts of this species have been carried out. One such study estimated the potential control costs maintenance and turbine cleaning) for 13 hydropower facilities on the Columbia river for Zebra mussels to be in the region of \$27 million annually.

Phillips S. (2005) Potential economic impacts of zebra mussels on the hydropower facilities in the Columbia river basin. Report prepared for the Bonneville power administration February 2005.

Case IV: Eradication of Invasive Plants in Portland, Oregon

In November 2005, the City of Portland held a Town Hall on Invasive Species. The meeting established the need for a long- term strategy for managing invasive plants. As a follow up to this meeting, the City Council passed Resolution 36360 which requires the City to develop a 3 year work plan and 10 year goals to reduce noxious weeds.

In response to resolution 36360, the City has estimated the cost of the complete eradication of invasive plants that are estimated to cover between 4,181 – 12,865 acres of vegetated land within city limits. This is between 13% and 40% of all vegetated land in the City

The estimated cost of invasive plant removal and revegetation with native plants is some \$12,000 per acre over a 5-year period. Over the five years, the City would spend \$50-\$154 million on invasive plant control and revegetation. There would also need to be an ongoing maintenance program, at slightly lower cost, to maintain invasive species-free conditions in our natural areas. The City generated this cost estimate to justify the need for establishing management priorities and securing funds to implement the highest priority management actions.

City of Portland (2008) *City of Portland Invasive Plant Strategy In Response to Resolution 36360*, June 18, 2008 Draft <http://www.portlandonline.com/shared/cfm/image.cfm?id=201474>

data. Only a few take into account non-use impacts of invasive species. This might be due to the difficulty in preparing estimates of these non-use values, and the controversy over the available methods (such as contingent valuation) used to quantify these effects. Economic analyses are hindered by the lack of uniformity in methodologies used, by uncertainty about what constitutes an adverse ecological impact, and by the difficulties in predicting the nature and magnitude of impacts. Using a “standard” methodology for what impacts to include in the assessment, what measurement methods to employ, and what discount rates and multipliers to use, will greatly improve the usability and comparability of these results in making policy decisions.

Table 2: Economic impacts of selected invasive species¹⁰

Species	Description of economic impact	Annual cost (adjusted to 2007 \$)
USA general estimate	Total direct, indirect use impacts	\$140 billion
Aquatic weeds (U.S.)	Losses, damages, control costs	\$120 million
Purple loosestrife (U.S.)	Control costs, forage losses	\$49 million
Weeds (U.S.)	Control costs, production losses	\$30 billion
Introduced rats (U.S.)	Consumption of stored grains, other materials	\$21 million
Invasive fish species (U.S.)	Depletion of natural stocks, other effects	\$6 million
Fire ants (Texas)	Damage to livestock, public health	\$328 million
Zebra mussels (U.S.)	Damage to infrastructure, control costs	\$1,093 million
Noxious weeds (21 species in Oregon)	Production losses, fire damage, control costs	\$120 million
Zebra mussels (Oregon) (projected)	Projected control costs to 13 hydropower facilities	\$25 million
Sudden Oak Death (Oregon)	Nursery production losses if established Control cost of current outbreak	\$79-\$304 million \$7 million
Invasive Plants (Portland, Oregon)	Complete removal and native species revegetation over five year period	\$10-31 million

Conclusion

An economic approach to invasive species management can provide policymakers at all levels with useful information to make important decisions about prevention, eradication

¹⁰ Pimentel D, Zuniga R, Morrison D. (2005). Update on the environmental and economic costs associated with alien-invasive species in the United States. *Ecological Economics* 52 pp. 273-288.

Lovell S, Stone, S, Fernandez L. (2006). The economic impacts of aquatic invasive species: A review of the literature. *Agricultural and Resource Economics Review* 35(1) pp. 195-208.

Local estimates are derived from the papers cited in the text boxes. All figures were converted to 2007 \$ for consistency.

and control. However, the management of IS will remain piecemeal, under-resourced and in aggregate largely ineffectual until:

- We have much greater awareness of the local, national, and international role that economic forces play in driving the IS crisis.
- We embrace a much wider role for economics that goes far beyond financial analyses in the search for solutions to the IS challenge. The use of a standard or common approach to performing economic analyses will improve the usability and comparability of the results within states and nationally.
- A greater level of coordination between local, state, national, and international agencies is achieved. In this respect, a comprehensive bio-security framework is the only way to avoid, remedy and mitigate the economic and ecological risks posed by IS.
- A higher level of education of both the public, government agencies, industry and non-governmental organizations, is achieved thereby strengthening all links in the IS management chain.

Case V: Controlling Sudden Oak Death in Southwest Oregon

Phytophthora ramorum, the cause of sudden oak death (SOD), is a recently introduced, invasive pathogen that kills oaks, wild rhododendron, and damages many other plants in western forests and horticultural nurseries. It is a threat to similar forests around the world, and is subject to state, national, and international quarantines. If allowed to spread unchecked in Oregon it would seriously impact southwest Oregon forests, and the resulting quarantine regulations would disrupt domestic and international trade of many forest and agricultural products.

The potential loss to nursery industry from SOD is estimated to be between \$79 million and \$304 million per year (direct management and regulatory compliance costs plus loss of markets). The annual timber harvest value of the four southwest Oregon counties (Josephine, Coos, Curry, and Douglas) is \$1.6 billion per year (based on 2006 data) and this would be severely impacted by quarantine regulations.

Since the first finding of SOD in Oregon in 2001, eradication of the disease by cutting and burning host plants has eliminated SOD from some treatment areas, but it continues to appear in new locations in and near the regulated area in Curry County. In 2006 and 2007 the disease expanded considerably. As a result of this expansion, Oregon's Curry County quarantine area was increased to 162 square miles in early 2008.

The current management program of early detection and eradication has cost approximately \$1.8 million per year. The cost of complete eradication is estimated to be a minimum of \$7 million per year for a period of three to five years. This cost has to be set against potential losses of at least \$100 million per year should SOD continue to spread uncontrolled in southwest Oregon.

Kanaskie A, Hansen, E., Goheen, E., Osterbauer N. (2008) Sudden Oak Death Eradication in Oregon Forests: The Final Phase. Oregon Department of Forestry, Oregon State University, US Forest Service, and OSU Oregon Department of Agriculture, 5-27-2008

Oregon's focus on early detection and rapid response is an integral part of a comprehensive biosecurity framework. However, if resource managers are inattentive to the underlying economic drivers of trade, commerce, movement of people and cultural demand for many NIS, the IS problem will continue, with ever greater resources required to control newly established IS and significant losses to the economic wellbeing of the state of Oregon and the nation. Greater appreciation of economics will expand the tools we need to address the invasive species problem at all levels of management.

Feral Swine Action Plan for Oregon



Center for Lakes and Reservoirs
Environmental Science & Resources

Feral Swine Action Plan for Oregon

Prepared for the
Oregon Invasive Species Council

by
Arick Rouhe and Mark Sytsma
Environmental Science and Resources



January 2007

Feral Swine Action Plan

Executive Summary

Feral swine are defined as free roaming animals of the genus *Sus* that are not being held under domestic management or confinement. Swine have spread from Europe and Russia to habitats around the world via human introduction. Currently, feral swine populations are established on every continent except Antarctica. Unlike other large mammal invaders, swine have a high reproductive capacity and are omnivorous, which allows for a quick assimilation into most habitats. Once a breeding population is established in an area, the population can quickly increase and negatively impact the ecosystem. A successful invasion of feral swine is difficult, and sometimes impossible, to reverse.

A feral swine pest risk assessment for Oregon, released in 2004, designated feral swine as a very high-risk species due to high potential for establishment, environmental and economic impacts, and disease transmission to wildlife, livestock and humans. Economic impacts on ecosystems and disease transmission to wildlife are difficult to assess, but restoration of ecosystems and losses to agriculture and livestock have been estimated to exceed US\$800 million in the United States each year. Environmental impacts include facilitation of noxious weed invasions, shifts in dominant plant species, reduction of forest regeneration, and soil erosion. Facilitation of noxious weeds and erosion due to feral swine rooting are documented in Oregon. Feral swine in Oregon have not been implicated in disease transmission to humans, but the recent *E. coli* outbreak from spinach grown on a California farm that caused three deaths has been genetically traced to feral swine excrement deposited in spinach fields.

The feral swine population in Oregon is currently small and dispersed. Few disturbances have been documented but state and federal biologists report regular occurrence of disturbances due to feral swine. Actions to prevent the effects of an invasion fall into three categories: management, control or eradication. Of the three categories, only eradication efforts have successfully slowed or reversed the effects of swine invasions. Case studies from California, Australia, Hawaii, the Galapagos Islands and the Channel Islands off the coast of California show that management and control

Feral Swine Action Plan

efforts, while effective in the short term, have not successfully kept small feral swine populations from increasing to levels that are unmanageable and uncontrollable.

A four-year feral swine eradication plan is proposed. The Plan includes recommended legislative changes to facilitate eradication, outreach and education, population assessment, rapid response, and eradication elements. A 0.5 FTE position is required at the Oregon Department of Fish and Wildlife to implement the plan.

Specifically, the Plan includes:

- Source Control (Task 1)
 - Legislation to halt the release or escape of domestic swine
 - Legislation to facilitate the removal of feral swine from private and public land
 - Ear tags for all domestic swine for identification of feral swine and escaped domestic swine
- Population Assessment and Public Education (Task 2)
 - Survey to estimate population locations and size
 - A database of locations and control efforts
 - Education of public to facilitate citizen reports of swine disturbances
- Eradication (Task 3)
 - Planned eradication of the known populations
 - Rapid response system for swift removal of new sightings and introductions of swine
- Monitoring and Assessment (Task 4)
 - Monitoring of each eradication area for two years.
 - Lack of disturbance after two years will lead to a designation of eradication success for each site.

Eradication of feral swine in Oregon is estimated to require a four-year, \$1.29 million effort. Follow-up control of new releases and escapes will require a maintenance effort estimated at less than \$50,000 per year (excluding contingency funds for emergency response). These costs are small relative to the value of the \$3.6 billion Oregon agriculture and livestock industries and the investment Oregon has made in riparian restoration efforts. Sustained control of feral swine in Oregon will require a long-term commitment that will include annual domestic swine marking, education, and monitoring.

Western Quagga Mussels

Background Information

- Quagga Mussels were found in early January 2007 in Lake Mead National Recreation Area¹
 - Populations have subsequently been found throughout the Boulder Basin of Lake Mead
 - Also in other Lower Colorado River lakes
 - Lake Mohave, AZ/NV²
 - Lake Havasu, AZ/CA
 - Copper Basin Reservoir, CA³
 - These lakes supply irrigation and drinking water to Southern Nevada, Southern California, and Southern Arizona
 - Also Found in Fish Hatcheries
 - Nevada State Fish Hatchery on Lake Mead
 - Willow Beach National Fish Hatchery



General Biology

- **Species Names**
 - Zebra mussels, *Dreissena polymorpha*
 - Quagga mussels, *Dreissena rostriformis bugensis*
- **Size**
 - Microscopic to about two inches long
- **Lifespan**
 - Typically up to 5 years
- **Reproductive potential**
 - May spawn all year if conditions are favorable
 - Peak spawning typically occurs in Spring and Fall
 - A few individuals can produce millions of eggs and sperm
- **Life Cycle**
 - Embryos are microscopic (< 100 microns)
 - Larval stage is planktonic (free floating), carried with currents
 - Adult stage attaches to hard surfaces with threads (like marine mussels), but can detach and move to new habitat
- **Impacts**
 - *Ecological*
 - As filter feeders, these species remove food and nutrients from the water column very efficiently, leaving less or nothing for native aquatic species
 - They have the potential of collapsing entire food webs
 - *Economic*
 - These species clog pipes, ruin boat motors, and damage aquatic recreational equipment
 - Once established in a lake, routine maintenance is necessary and perpetual
 - Management costs are enormous, particularly for industrial raw water users like power stations and water supply agencies

Frequently Asked Questions

- **What's the difference between Quagga Mussels and Zebra Mussels?**
 - *Short Answer: Not Much*
 - These are two species within the same genus *Dreissena*
 - Zebra Mussels invaded North America First (in mid-1980s)⁴
 - Quagga Mussels invaded a few years later (1989)⁵
 - There are morphological differences, but they are subtle
 - There are ecological differences, but more research is needed on North American quagga mussels to assess these differences
 - The practical implications of zebra and quagga mussels are essentially identical
- **Where did they come from?**
 - *Short Answer: Eurasia*
 - Zebra Mussels came from the Black and Caspian Sea Drainages
 - Quagga Mussels came from the Dneiper River Drainage in the Ukraine
- **What temperatures can zebra mussels and quagga mussels tolerate?**
 - *Short Answer: Between 1-30°C (33-86°F)*
 - **Heat Tolerance**⁶
 - Zebra Mussels can survive in waters as warm as 30°C (86°F)
 - Quagga Mussels may be able to survive in waters as warm (need more research)
 - **Cold Tolerance**⁶
 - Both zebra mussels and quagga mussels can survive cold waters near freezing, but cannot tolerate freezing.
 - Zebras need waters above 12°C (54°F) in order to reproduce
 - Quaggas need waters above 9°C (48°F) in order to reproduce
 - **Temperature Preference**⁶
 - Zebra Mussels survive and reproduce best in waters near approximately 18°C (64°F)
 - Quagga Mussels survive and reproduce best in waters slightly cooler, approximately 16°C (61°F)

- **What other physiological tolerances do zebra and quagga mussels have?**⁶
 - **Salinity:** needs to be low (< 5 PPT)
 - **Calcium:** needs to be high (> 25mg/liter)
 - **pH:** needs to be high (in the range of 7.4 – 9.5)
 - **Oxygen:** both species can temporarily survive low oxygen concentrations
 - Zebra mussels need > 25% of full oxygen saturation to grow and reproduce
 - Quagga mussels are more tolerant of low oxygen concentrations than zebra mussels
 - **Water Velocity:** needs to be low (< 2 m/sec)⁷
 - **Substrate:** both species prefer hard surfaces
 - Quagga mussels can tolerate living in soft sediments, but zebra mussels seldom do
- **What do they eat?**
 - *Short Answer: Algae and bacteria in the water column*
 - Both species are filter feeders
 - Quagga mussels are more efficient filter feeders than zebra mussels
- **What eats zebra mussels and quagga mussels?**
 - *Short Answer: No natural predators in North America*
 - Many species do eat these mussels, including diving ducks, red-eared sunfish and some catfish, but predators cannot keep up with the explosive reproductive potential of these invasive mussels
- **What Depths can you find zebra and quagga mussels?**
 - *Short Answer: At any depth, but quaggas mussels can be found deeper*
 - Zebra mussels are typically found from just below the surface to about 12 meters (40 feet)
 - Quagga mussels are typically found at any depth as long as oxygen is present
 - Both species prefer to avoid light and are usually found in shaded areas or below the depth that light penetrates water
- **Why aren't they a problem in Europe?**
 - *Short Answer: They are, but most Europeans have been dealing with them for over 200 years. Their industrial facilities were designed with these in mind.*

- **How do they spread?**

- *Short Answer: Larvae flow downstream. Adults attach to recreational boats and equipment (anchors, bait buckets, etc).*
 - Eggs and larvae will naturally flow downstream of established populations.
 - Larvae can also be transported in water carried by recreational boats, trailers, and other aquatic equipment.
 - Adults can also be spread by recreational boats, trailers, and aquatic equipment.
 - Adults can survive out of water for weeks if temperatures remain cool and humidity remains high.
 - Quagga mussels were probably transported overland at least 1000 miles from their source population (most likely the Great Lakes)
 - Resident boats (those boats that are moored or held in a slip) are much more likely to harbor zebra and quagga mussels than day boats (boats that are removed from the water after each use).

- **How can we prevent additional spread?**

- *Short Answer: Educate boaters.*
 - Preventing downstream invasions is practically impossible.
 - Convincing recreational boaters to clean their boats and equipment before transporting them to new waters is essential.
 - Simple steps are necessary every time a boat is retrieved from a lake or other water body:
 - Remove all aquatic plants, animals, and mud from everything that came in contact with water.
 - Drain all water, including bilges, live-wells, cooling water from the motor.
 - Clean and dry everything that came in contact with water
 - Dispose of any live bait.
 - If mussels are seen attached to a boat or other recreational equipment, it must be decontaminated using more stringent guidelines.
 - A decontamination protocol is attached.

- **Where can I learn more?**

- www.100thMeridian.org
 - The 100th Meridian Initiative is a cooperative effort between state, provincial, and federal agencies to prevent the westward spread of zebra mussels and other aquatic nuisance species in North America. The associated website is the official coordination point for information regarding zebra and quagga mussel spread to the western United States.

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Decontamination Protocol

For Boats and other Recreational Equipment Potentially Contaminated with Zebra/Quagga Mussels

Step 1: DRAIN

Bilges, wet wells, live wells, and any other compartments that could hold water from an infested field collection site should be drained of water at the boat ramp before leaving the area. If a boat has carried water from another location, remove all water and treat it with household bleach (> 5% sodium hypochlorite) at a concentration of 3 oz of bleach per 5 gallons of water for a minimum of 1 hour before disposing in wastewater drain. Never dump water to the ground.

Step 2: PURGE

In order to kill and purge larvae that may be in the engine's cooling system, run disinfecting water through the motor for at least 1 minute. Disinfecting water should be either 1) a bleach solution using household bleach (> 5% sodium hypochlorite) at a concentration of 3 oz of bleach per 5 gallons of water, or 2) tap water heated to > 140 °F. Running bleach through an engine may violate the terms of the engine's warranty, so hot water is recommended.

Step 2: SCRUB

Scrub all surfaces with soapy water to remove any clinging material (plants, animals, mud, etc.), then visually inspect and remove anything remaining. Pay special attention to cracks and crevices in which mussels may become trapped, and aquatic plants harboring juvenile mussels that may be present on trailers or propellers. Since adult zebra/quagga mussels can close up and survive for extended periods of time under toxic external conditions, chemical disinfecting as a means to kill adult mussels may require a contact time of several days. Thus, chemical disinfectants are not recommended for killing adult mussels. At this step, the goal is to remove any and all living organisms as well as mud and other debris.

Step 3: WASH

Hose down everything with hot high pressure water, including boat, anchors, trailer, and anything else that came in contact with the water. Pay particular attention to trailer pads made of carpet and foam rubber, which could trap tiny mussels. Temperature and exposure time determine the effectiveness of temperature treatments. Live steam, boiling, and hot (> 140 °F) power washing are all believed to be effective against all zebra/quagga mussel life stages. Work a small section at a time with a minimum exposure of 3 min at full heat for each area.

Step 4: DRY

After thorough scrubbing, power washing and visual inspection, dry the boat and all equipment and keep everything out of the water for at least 2 weeks if temperature is below 70 °F or 1 week if weather is warm (> 70 °F) and dry (< 40% relative humidity). In winter, freezing may be used as an effective tool. Adult zebra/quagga mussels have a relatively low tolerance to freezing. Exposing boats and equipment to continually freezing temperatures for a recommended period of three days should produce 100% mortality.

Information Sources

¹National Park Service Press Release 1-07, January 10, 2007

²Invasive Mussel Update, NPS Digest, National Park Service, January 23, 2007

³USGS Nonindigenous Aquatic Species Database, Collection ID 237660

⁴Zebra Mussel Fact Sheet, USGS Nonindigenous Aquatic Species Program

⁵Quagga Mussel Fact Sheet, USGS Nonindigenous Aquatic Species Program

⁶McMahon, R.F. 1996. The Physiological Ecology of the Zebra Mussel, *Dreissena polymorpha*, in North America and Europe. *American Zoologist* 36:339-363

⁷O'Neill, C.R. 1993. Control of Zebra Mussels in Residential Water Systems. Sea Grant: Coastal Resources Fact Sheet

Sudden Oak Death *Phytophthora ramorum*

D. Shaw

What is it?

Sudden Oak Death (SOD) is a plant disease caused by the water mold *Phytophthora ramorum*. This organism causes disease in more than 100 species of trees, shrubs, herbs, and ferns.

P. ramorum can infect oak and tanoak directly through the bark, causing an area of dead tissue, a canker, often indicated by bleeding on the bark surface (Figure 1). The tree eventually is compromised and dies. It may look as if the tree dies suddenly, but actually it's been infected much longer.

P. ramorum causes leaf blight and twig dieback in most host species, especially in rhododendron, camellia, and huckleberry. The disease is called ramorum



Figure 1.—Bleeding on bark surface of tanoak. Photos: Alan Kanaskie, Oregon Department of Forestry.

leaf and shoot blight in these hosts. Common plants in Oregon that are known hosts for *P. ramorum*, and the diseases in those hosts, are shown in Table 1. For a complete host list, see the California Oak Mortality Task Forest website <http://nature.berkeley.edu/comtf/>

What is at risk?

Phytophthora ramorum is an internationally quarantined plant pathogen, and strict restrictions aim to prevent its spread. Quarantines and regulatory compliance impact the economics of growing wood and plants in Oregon. We must do all we can to prevent the spread of this disease.

The disease threatens timber trade, the floral-greens industry, Christmas tree production, and plant nurseries throughout Oregon. It has the potential to increase fuel loads in forests, thus increasing fire risk. In forests, it also could affect slope stability, harm wild mushroom populations, and alter forage and structural components of wildlife habitat. The cost to forests and nurseries in Oregon of eradication and compliance work already is more than \$10 million.

How is it spread?

Sudden Oak Death and the other diseases caused by *P. ramorum* are so



Figure 2.—Shoot dieback symptoms of *P. ramorum* on rhododendron. Photos: Alan Kanaskie, Oregon Department of Forestry.

new that information is only now accumulating rapidly. Observations from California, where the disease is widespread, suggest it may be limited to warmer, wetter coastal and near-coastal environments. In California, disease behavior is linked closely to forest composition and structure, spreading on California bay laurel (called myrtlewood in Oregon) and killing tanoak. In Oregon, tanoak and rhododendron are the primary hosts on which we know the disease can spread (Figure 2). So far, Oregon myrtle has not become widely infected, as in California (Figure 3, next page).

Local spread of *P. ramorum* is well documented, but its long-distance dispersal is less well understood. Populations of *P. ramorum* in California and

Table 1.—*P. ramorum* hosts and diseases.

Disease	Host
Sudden Oak Death	Tanoak California black oak
Ramorum leaf blight	Oregon myrtle Bigleaf maple
Ramorum shoot dieback	Evergreen huckleberry Rhododendron Pacific madrone

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Figure 3.—Symptoms of *P. ramorum* on Oregon myrtlewood (California bay laurel).

Oregon woodlands belong to a single clone that has reproduced asexually. This occurs via the prolific production of spore packets, called sporangia, that can easily break off in rain and

flowing water. Sporangia release spores that can swim through films of water to infect leaves and bark. *P. ramorum* also can form a resting spore (chlamydospore) that stays in plant material or soil a long time, perhaps more than 1 year, and germinates only under the proper conditions.

People are the best means for long-distance spread of *P. ramorum*, by transporting potted plants or infected wood, leaves, and stems. *P. ramorum* spores also can survive in soil on bike and vehicle tires and on shoes and tools. If you have been in an infested area in California, remove the soil from these items before you return to Oregon. Do not transport plant material from coastal California to Oregon!

Where did it come from, and where is it now?

The origin of *P. ramorum* is unknown. It also is in Europe, in a population genetically distinct from the one in North America. It appears that both the European and North American types of *P. ramorum* were introduced from an unknown location.

In the urban-woodland interface and in forests, Sudden Oak Death is known only in 14 counties in California and in a 26-square-mile area near Brookings, OR (Figure 4). How SOD came to the Brookings area is not known. No other locations in the wild are known in North America.

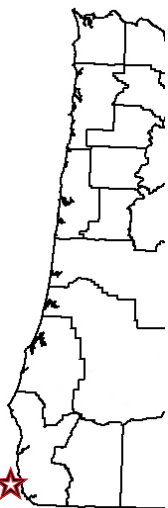


Figure 4.—In the wild in Oregon, SOD currently is limited to an area around Brookings (star).

Sudden Oak Death has been found in several plant nurseries in Oregon and other states, and these nurseries are under strict inspection and eradication protocols. Each year, new outbreaks are detected, and much effort is spent suppressing the disease.

What is being done?

Phytophthora ramorum is being eradicated in Oregon forests (Figure 5) through the cooperation of the Oregon Departments of Forestry and Agriculture, the USDA Forest Service, the USDI Bureau of Land Management, and Oregon State University.

Surveys for the disease are done by air and ground and in streams throughout the year. In nurseries, inspections for diseased plants are routine. Whenever infected plants are discovered, they and neighboring plants are destroyed.

What you can do

- Do not transport plant material or firewood from affected areas in California to Oregon.
- Before returning to Oregon from affected areas in California, wash mud and soil off your vehicle, equipment, clothing, and footwear. If possible, use a 10-percent bleach solution for washing.
- Familiarize yourself with host plants and symptoms of the diseases caused by *P. ramorum*. This can be tricky! The host list is long, and many other plant pathogens cause diseases with similar symptoms. See below for some sources that can help.
- Keep on the lookout for infected plants in south coastal Oregon.

- Report to OSU Extension foresters or state or federal forestry officials if you think you have seen Sudden Oak Death.
- Do not move host materials or soil from the quarantine zone near Brookings, OR.
- When purchasing host plants from nurseries, ask nursery management about the origin of the plants and whether they have been inspected.

For more information

Sudden Oak Death and Phytophthora ramorum. A guide for forest managers, Christmas tree growers, and forest-tree nursery operators in Oregon and Washington, EM 8877. 2006. E.M. Goheen, E. Hansen, A. Kanaskie, N. Osterbauer, J. Parke, J. Pscheidt, and G. Chastagner. <http://extension.oregonstate.edu/catalog/pdf/em/em8877.pdf>

The California Oak Mortality Task Force
<http://nature.berkeley.edu/comtf/>

USDA Agricultural and Plant Health Inspection Service (APHIS)
http://www.aphis.usda.gov/plant_health/plant_pest_info/pram/regulations.shtml

OSU Extension Service
http://extension.oregonstate.edu/emergency/oak_death.php



Figure 5.—Symptoms of *P. ramorum* infection on a Douglas-fir shoot tip (left) and on grand fir. Photos: (left) Alan Kanaskie, Oregon Department of Forestry; (right) Santa Clara County (CA) Agriculture Department.

2009 Invasive Species Legislation Overview

Key legislative concepts and policy option packages addressing invasive species are currently proposed for the 2009 legislative session. These proposals cover a variety of issues, from basic funding to law enforcement authority to programmatic clarification. This document is a summary of the primary legislative concepts now proposed.

Quagga & Zebra Mussel Inspection Stations, Enforcement Authority

The Oregon Department of Fish and Wildlife is proposing this policy option package to establish a zebra and quagga mussel transportation monitoring program.

Since the initial discovery in January 2007 of quagga mussels in Lake Mead, Arizona, mussels have been found throughout the lower Colorado River system and connected aqueducts and reservoirs in Arizona, Nevada, Utah, and California. The economic dislocation is unfolding rapidly, with millions of dollars spent to de-water municipal water delivery systems, clean, replace, or install new screening systems, valves and other affected equipment, install control systems, monitor and control impacts at hydroelectric, irrigation, and municipal water supply facilities, implement enforcement protocols and inspection stations, close or control recreational access to lakes and reservoirs, and more. Because recreational boaters regularly tow their vessels long distances, these new invasions represent an imminent threat to Columbia Basin waters.

This damage is consistent with damage seen throughout the Midwest, where these mussels were first introduced in the mid-1980s. The mussels are responsible for half-billion dollar economic impacts annually, costing power generators an estimated \$100 million per year while decimating recreational and commercial fisheries in the Great Lakes and creating toxic conditions killing hundreds of thousands of waterfowl annually. The federal government estimates that a Columbia River infestation could cost up to \$50 million per year just for hydropower operators. An infestation would also significantly damage salmon restoration efforts and recreational opportunities.

Quagga and zebra mussel infested boats from Oregon and Washington have already been stopped at border check stations in California as they return to their home states. Several infested boats have been transported through Oregon. Border check stations are being proposed in an effort to prevent the spread of zebra and quagga mussels and other aquatic invasive species into Oregon. Under this proposal, inspection stations would be placed at primary border crossings and would be staffed by specially trained technicians. All watercraft entering Oregon would be required to stop for a brief inspection for quagga and zebra mussels and other aquatic invasive species. The current proposal requires extensive general fund support.

Washington, Idaho, and other western states are developing similar concepts. In California, multiple state agencies coordinate inspection efforts to prevent the spread of mussels to non-infested basins within the state.

In addition to the funding, enforcement authority is also required to stop vehicles that are pulling boats and related equipment. Modeled after Washington laws, the statute would require motor vehicle operators to stop for watercraft inspections, but would suspend any fines or citations if invasive species were found.

Demand for general fund will likely be high across all of state government in 2009, so finding alternative funding sources to implement this program is crucial to prevent the hundreds of millions of dollars in damage experienced in the Midwest, East Coast, and now the southwest United States.

Feral Swine Management Program

Currently feral swine are threatening to expand their range across Oregon as established populations go unchecked and new populations are reported on a regular basis. Feral swine decimate watersheds and wildlife habitat. Feral swine damage to agriculture in the United States is estimated to cost \$800 million per year. Currently many of the populations in Oregon are intentionally established on private lands by landowners who offer fee hunting for feral swine.

The Oregon Department of Fish and Wildlife has proposed this package to establish base funding for feral swine eradication while strengthening laws and rules that govern feral swine.

Feral swine are defined as free roaming animals of the genus *Sus* that are not being held under domestic management or confinement. Swine have spread from Europe and Russia to habitats around the world via introduction by humans. Currently, feral swine populations are established on every continent except Antarctica.

A feral swine pest risk assessment for Oregon, released in 2004, designated feral swine as a very high-risk species due to significant potential for establishment, environmental and economic impacts, and disease transmission to wildlife, livestock, and humans.

Environmental impacts include facilitation of noxious weed invasions, reduction of forest regeneration, soil erosion, and increased depredation of native wildlife. In addition, feral swine are opportunistic predators of ground nesting birds, turtles, frogs, and even young fawns – many species of which are identified in the Oregon Department of Fish and Wildlife's Conservation Strategy as species important to these ecosystems. The feral swine population in Oregon is currently small and dispersed, with an estimated total population of 1,500 to 2,000 animals in four locations in Oregon. With this fact in mind, the Oregon Invasive Species Council (OISC) created and released the Feral Swine Action Plan in early 2007. The Feral Swine Action Plan includes recommended legislative changes, eradication strategies, population assessment, rapid response, and outreach and education elements.

This legislative concept will address the core cause of feral swine populations in Oregon and significantly increase the opportunity for feral swine eradication efforts to succeed.

This legislative concept is critical to give the Oregon Department of Fish and Wildlife and the Oregon Department of Agriculture the tools to control and eventually eradicate feral swine in Oregon. Feral swine will threaten the health and well-being of farmers and ranchers through crop damage and animal depredations. In addition, hunters and anglers will see direct and indirect impacts to Oregon's natural resources.

County Weed Control Programs

Oregon's 36 counties are responsible for enforcing laws relative to noxious weeds (ORS 570); however, no dedicated funding source has been established for this service, and most counties lack weed control programs. As a result, noxious weeds go uncontrolled, damaging fish and wildlife habitats, reducing crop values, impacting public and private properties, and continually reinfesting counties that do have control programs.

In 1999, the Legislature directed the Oregon Department of Agriculture to create the Oregon Noxious Weed Strategic Plan. Within that document, "Establishing strong statewide, county and local weed control programs.. ." was listed as a top priority, but no base funding for counties was ever established.

The Legislature has made available Measure 66 Lottery Capitol Funds through the Oregon Department of Agriculture and the Oregon State Weed Board. In the current 2007–09 biennium, there is \$2.5 million available in noxious weed control grants that protect fish and wildlife habitat and watershed functions. These grants have helped support on-the-ground control projects. However, these funds cannot be used to support base programs, an essential component for maintaining viable programs and thus protecting natural resources. Most counties do not have funding for weed control programs, thus no enforcement is in place to stop new invaders from reaching Oregon soils.

The single greatest threat to healthy ecological systems is the rapid spread of noxious weeds. Ecosystem health, biodiversity, and healthy watersheds depend on properly functioning native plant communities. If the plant community is functioning well, other components of the ecosystem will also function well.

A conservative assessment documents an impact of \$83 million annually lost to personal income from just 21 of the 99 Oregon listed weeds in 2000. One weed alone, Scotch broom, has invaded more than 16 million acres, causing over \$47 million in annual economic impact to Oregon. Yellow starthistle is forming a sea of thorns in eastern Oregon and has impacted 1.8 million acres of private and public lands statewide.

To meet this challenge, county weed control districts need stable base funding. This will help sustain consistent weed control throughout the state, and support statutory requirements. To receive assistance, counties will be required to meet specific obligations and demonstrate accomplishments. Funding needs to be flexible, so counties can be staffed with weed control personnel, as well as replace equipment, and implement management actions. Base funding for each county is estimated at \$150,000, or a total of \$5.4 million per year for all 36 counties in Oregon.

However, to insure statewide coverage, a stable source of funding must be identified.

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Appendix C—Notes from Eight Facilitated Sessions

Note: The information contained in this appendix was transcribed exactly as it was noted on the facilitated session note sheets. No changes have been made to the raw data, nor has it been summarized in any way.

ELKHORN

Responses to question #1:

1. Recognition that there is a problem - legislature
 - Economic and biologic
2. Lack of vehicle/process to provide coordination/integration
 - no one is in charge
3. Lack of common definitions
3. Proliferation of lists
4. Lack of market considerations in regulations
5. Need to work across legal ownership boundaries
 - Mechanism for local implementation
 - Balance between strategic and local approaches
6. Lack of statewide assessment (inventory) - where they are and aren't
 - What are the problems and where are they, what are the priority species to manage and areas (habitats) to protect
 - Lack of focus on pathways/vectors
 - Lack of natural history ed.
 - Lack implementation capacity of strategic outreach plan.
 - Internet sales unregulated pathway
 - Recognition of existing programs
 - Competition for grants amongst applicants
 - Lack of regional (multistate) cooperation, planning - at various levels, may be different management priorities for local, state, and federal
 - Lack of established priorities for seeking funding
 - Lack of rapid response strategy and funding

ELKHORN

Responses to question #2:

1. Distribute existing materials
 - Develop targeted information
 - Summarize economic impact
 - Distribute OPB documentary
 - Focus on pictures/bullets
 - Focus on individual legislators district
 - Invasive species day at the legislature
 - Strength of atypical partnerships i.e., TNC and Cattlemen's Association - approaching legislature
2. A policy staff position (invasive) at governor's office
 - OISC - Policy + Direction
 - Top-down support for OISC to make decisions + OISC Council establishes infrastructure, framework, priorities to be implemented by agencies, on the ground groups
 - OISC could be a fiscal agent for funneling \$ to implement actions
3. Develop regional lists - develop/document criteria for listing.

4. Include industry in listing decisions
5. CWMA's and watershed councils could be mechanism for working across boundaries, however, may need funding for coordination and how link CWMA's to regional or state - OISC Advisory Group
6. Heritage program - manage invasives inventory as part of biological inventory - look at potential habitat.
 - Build on ODFW Conservation Strategy
 - Database of invasive management actions - similar to ODFW and BLM
 - Weedmapper and wildlife viewer expanded database to map invasives
 - OISC to help integrate management priorities - get input from CWMA's and watershed councils and industry

WALLOWA

Question #1:

- Money
- Authority - \$/action
- Lack of coordination
 - Clear legislative mandate
 - Political will
- Timeliness - permits/NEPA/etc.
 - Need to pre-plan, EDRR
- Social responsibility/ed. And support (civic duty)
- Internal education and awareness
- Availability of management tools for AIS
- Priority to Act (the plate's too full)
- Hesitance to act (stages of grieving)
- Staffing
- Lack of central leadership
 - Convoluted/diluted
- Clearly communicate structure to public
- Public voluntary rapid response
 - See it, pull it, kill it
- Quantify thresholds
 - I.D. thresholds
 - Bureaucratic hurdles
 - Inconsistent information
- One-stop shopping
- Pre-planning and prep.
- Money
 - Lack thereof . . .
 - Wise use of existing funds (priorities) accurate assessment
 - Emergency fund
 - Long-term funding for stability - user pays, appropriate assessments
 - "Fire" assessment
 - Value of prevention and eradication and odds of success
- Authority
 - Fire - Incident Command Structure
 - Formalized interagency agreements to facilitate rapid response
 - Agency of authority needs fund pool to facilitate action
 - ID Holes, create statues (capacity to act)
 - Creative use of existing resources

WALLOWA

Question #2: (this group noted that items with an asterisk were key prioritized issues)

- Public awareness/empowerment
- Authority
- Funding
- EDRR
- Coordination and outreach
- Contain/control/eradicate
- New structure focuses on aquatic and unidentified issues
 - A) **Virtual Action Team** - sets priorities, creates agreements - state/federal/private partners, NGOs
 - Authority
 - Funding - emergency, permanent
 - B) Education
 - C) Strike Team EDRR

- Focused on aquatics, but emergency funding for terrestrial and aquatics
- Governor's Cabinet - Virtual Action Team (SCAAT) - OISC is Board
 - *Full-time personnel supt.
 - Works on funding/MOU agreements with agencies
 - Full management structure
- Strike Team
 - Deals with acute problems
 - Assigned by SCAAT
 - * Puget Sound Action Team (Partnership)

How to fund?
 How to create?
 Governor's order?
 Leg. Action?

- General Coordination and Outreach (see it, pull it, kill it)
- Contain control eradicate
- Pass thru funding structure

BLUE MOUNTAIN

Question #1:

- Multiple agencies have some authority, but no real leading agency/group
- Interagency coordination/cooperation leads to more effective resource utilization
- \$\$ - needs to be increased and spent strategically
- Lack of awareness - not recognized as having local, immediate impacts
- Improving interstate communications and programs
- No federal support (\$ and other resources or in coordinating efforts)
- Resource need may be overwhelming
- A need to determine where to focus - statewide and nationally
 - How do we prioritize?
 - Who does the prioritization?
- Operational challenges - time-consuming, limiting tourism, logistics
- Obtaining social acceptance of procedural activities - politics? Social paradigm shift?
- Lack of holistic approach
- Self-limiting factors - including existing laws
- Invasives not treated with same sense of urgency as wildfires
- Lack of emergency funds
- Problems may be overwhelming
- Private industry needs to be completely engaged
- Conflicting priorities and conflicting authorities
- Convince . . . everyone that prevention and EDRR are much less expensive than large scale control
- Industry may have tendency to focus on “engineering solutions” instead of natural resource prevention methodologies

BLUE MOUNTAIN

Question #2:

- Create a Plan of Action for whole state
 - Establish legislation that defined authority (defines a responsible party)
 - Different groups may be best leaders under different circumstances
- Review existing authority of existing agencies
- Gain “general fund” support for this issue that affects everyone - emphasize that prevention is cheaper than control
- Better monitor and use existing dollars through strategic action planning and coordination between agencies/groups (don’t duplicate efforts)
- Awareness can be increased through public education and concern
- Aim awareness campaigns at broad array of people - use topics of interest (\$, power availability, fishing . . . watershed health)
- Develop emergency fund - partly through legislation
- Get industry engaged and actively involved (\$)
- Strengthen existing legislation (ex: prop. Assess. For weeds at low rate)
- Additional money ideas:
 - Vanity plates (weed, mussel)
 - Lottery
 - Measure 66
 - Import tax (per container?)
 - Use cheap labor: college students, Americorps . . .for monitoring and inventory work
- Acknowledge that there is no single solution

TROUT CREEK

Question #1: (this group identified priority items with a check mark)☑

- ☑ Need emergency fund to deal with high impacts species. Achievable projects.
 - Assess presence and absence of threats (1°)
- ☑ Public outreach/education
 - Don't have threshold of public concern
- ☑ Entrenched constituencies for invasives (knowingly and unknowingly)
- ☑ Lack of general knowledge (**#1 priority**)
 - People don't understand liability of invasive species
 - Differences in value - some value invasive species
- ☑ No policy on dealing with invasive species. Articulate in legislative/policy direction (**#2 priority**)
 - Not clear who regulates what
 - Assess who has jurisdiction
 - Lack of state infrastructure
- ☑ Lack of legislation - defaulted to underfunded agencies
 - Lack of invasive species prioritization
- ☑ How to set IS priorities with other priorities
- ☑ Lack sense of urgency
 - Feeling overwhelmed!
- What if funding
 - Is a barrier?
 - Is not a barrier?
- Where can we make a solid economic case?
- Where are the greatest biosphere impacts?
- Individuals don't see themselves as a problem
- Lack of personal ownership as solution
- Connecting with the emergency of the moment (e.g., political leverage for a specific interest)
 - Both barrier and opportunity
- Lack of science and effective BMP's
- Collateral damage from BMP's
- ☑ Lack of state-led EDRR and database
 - Lack of forum to pose information/research needs
 - Lack (standardized) adequate monitoring systems for IS
 - Not just volunteer-based
- Need better integration among all agencies and groups
- Need (lack of) communication and databases that are integrated
- ☑ No clear risk assessment for prioritizing species
 - After the fact regulations
 - Also a reality of how things are done
- ☑ Lack authority and enforcement
 - Lack of support for IS working groups like county and boards
 - IS species interacting with G.C.
 - Dealing with uncertainty
- Accepting those invasive species that have become established over those that are new

TROUT CREEK

Question #2:

#1 No policy on invasive species and funding

- Have assessment ID Gaps → OISC → Plan → Action: Can this work?
- Create legislative committees → leads to policy
- Go to experts first to drive legislation
- Evaluate what is being done on invasive species
 - 50% resource managed by agencies
- Use available information to synthesize assessment - go to legislature
- Go to legislature to fund assessment
 - Have legislation to:
 - Recognize critical players
 - i.d. what is happening
 - i.d. unmet needs
 - how fast can we act?
- Create a framework that addresses both crises while building pro-active framework
- Develop clear policies

View #1: Is the state favoring invasive species as a priority - as a policy?
Have an invasive species “Czar”
One clear authority

View #2: Governor → Executive Order
Eradicate/prevent invasive species → agencies set aside funds, resources short-term
Task force (OISC) by Governor’s office (long term) to come with a statewide plan for funding and action. OISC needs funding authority.

View #3: Other models that require agencies to work together like “Oregon Plan” model
- dedicate lottery funds
Do we have enough knowledge to establish an “invasive species” plan?

- Have the right agencies in place to effectively use “emergency funds”
- Who is in charge?
- Have contingency plans that ID clear authorities
- A glossary of experts
- Connect experts → species
 - Expertise, technical, taxa, glossary of key people

#2 Lack of knowledge, outreach, education

- Good start with OPB and Salem Statesman Journal Campaign
- Fund correct OISC efforts
- ID agencies with a stake in invasive species
- Have consistent message on invasive species relevant to local level
- How to allocate resources at local priorities/regional
- Calls for action must make sense to public
 - E.g., feral pigs may not be relevant to many local groups
- Feral pigs versus false brome - what’s the priority and message?
- Be aware - help volunteers to promote citizen science
- Engage people in prevention and early detection
- Go beyond awareness to action
- Need to have social norms that invasive species prevention and control is “my” responsibility
 - a) take it local/individual

b) integrate norms into organizations/cultures

- Have transparent system and logical process for assessing risks and listing priority species
- Tie in with programs that are already working
 - “Kids in the Woods” outreach
- Meet with local groups prior to EDRR training
 - Can someone really learn more than 5 or so species for EDRR
- Think pathways - how do species get here - results in more effective prevention
- Consider systems - puts invasive species in context (e.g., watersheds, stream flow, wood, etc.)
- What can people do? Care about tidepools.
- What is possible within my abilities?
- Create a sense of urgency
- Audiences need to see urgencies reflected in their “leadership”
- If we go to people, we need to have some solutions
- OISC needs to convey who is doing what
- Who is working on certain species?
- Have a database of who/what is dealing with specific invasive species - back to glossary of the who’s (people)
- Message could also be communicated through existing agency networks
 - Use an existing network
 - Have statewide messages

PUEBLO

Question #1:

- No EDRR system in place
- No coordinator*
- No GIS/Tracking system
- No emergency response fund
- Dedicated funding from legislature
- Due to multiple agency issue, streamline of coordination, issues.
- Public Awareness* (continued concern/awareness) → changing secretive relationship / view of nature
- Avenues to compile and disseminate funding pods
- Lack of dedicated staff dedicated to invasive species issues (lack of internal coordination)
- Lack of developed checkpoints and authorities (ports, airports, highways)
- Lack of state-state coordination with checkpoint efforts
- No laws that allow for real enforcement with invasive species issues
- *Coordinating regulatory approval proactively as possible
- Lack of environmental professional trainings offered focusing on invasive species
- No shared interagency strategies (MOUs)
- Filling gap, looking at issue in broader realm - funding coordination
- How to address pathways where agencies don't/do overlap
- Engaging key agencies in response plan
- No baseline risk assessment → no interagency science committee
- No statewide legislative/regulatory framework
- Legal authority not clear → search and seizure
- Ensure appr. representation to ensure OISC assigns proper entities . . .

PUEBLO

Question #2:

- Prevention
 - Establish border checkpoints
 - Establish lead authorities (clarify)
 - Legislatures create authority (enforcement) and operations (SOPs) (ref. Inspection Station Art. In Agenda)
 - Need comprehensive interagency strategy (ODA, DEQ, etc.)
 - *EDRR → Species Priorities
 - Organization Assessment (roles and responsibilities)
 - 5-year plan
 - Policy roadmaps
 - E/O
 - Resource ID and gaps
 - Complement national standards
 - Common data standards
 - Coordinating regulatory approval
 - Approach issues (prevention) on a large scale (be involved in national efforts, neighboring states) *West Coast Governor's Agreement
 - Involve all key stakeholders and get buy-in from elected officials
 - Ensure lead agencies (ODA, USDA, DOT, Tribes, etc.) have appropriate dedicated staff
 - Point person
 - EDRR staff
 - Control crews . . .
 - Framework?
 - Get resources (\$) to county weed boards

- Figure out mechanism/authority to manage and disseminate overall funds and emergency funds (see Idaho as a template)
- To encourage monitoring and prevention, create stewardship (citizen-based) tools to alert authorities (website, exams, park information forms)
 - Boater registration and online exam
- Identify and control major pathways
 - Pet and plant trade tracking (nurseries, websites)
 - Develop strategies and regulations to address
 - Check reg. authorities/laws existing and assess needed regs.
- Establish revenue streams
 - Boater Cert. Fees
 - ATV Registration
 - Shipping fee (i.e., California)
 - Tire tax
 - Herbicide enforcement fees
 - Pet trade tax
- Crafted resolution to disseminate to counties to start local resolutions

CASCADE

(This group listed the answer to question #1 in black, made notations in red, and provided solutions in green)

- Communication
- Regulations (not scalable)
- Interagency/ownership cooperation
- 2. Efficient training - professional
- Emergency fund
- Funding restriction - limits on outreach efforts - needs common outreach and education
- 5. EDRR takes vision away from long-term research (5-10 year)
- 3. Information to become better at strategic prioritization of expending limited \$\$
- 1. STATEWIDE ASSESSMENT
- Boundary issues - inhibit regional response
- 4. Contingency planning
- No money for enforcement
- Public awareness obstacle
- Need to replace timber receipts County funding (invasive species is at bottom)
- Centralized vetted information
- Advertise existing website - Oregon - coordinate and links public vs. scientific information
 - Mixed messages
 - Confuse public
 - Lots of lists
 - Lots of terminology
- Who/how enforcement is affected at the public
- Sustained public awareness (e.g., OPB) (e.g. “Smokey” “Hitchhiking spike” - MULTIMEDIA)
- Curriculum implementation - BLM’s “Alien Invasion”
- Develop local sources for biological supplies
- Statewide IS education coordinator (Steal from Forest Soc)
- Extension
- Master Gardeners
- Funding for/continue hotline website (OPB)
- Long-term stable source of flexible funding
 - E.g., capital funds vs. operational dollars
- Public service charge via electric bills to fund invasive species - rationale is that everyone uses electricity, e.g., 5 cents per month
- Tax the Vectors, e.g., containers, tires, etc.

SISKIYOU

Question #1:

- Clear statement of problem
- Lack of appropriate science to define problem
- Lack of awareness of magnitude and sense of urgency of IS for general public
- IS - not one problem - a package of problems
- Find starting point/entry point for individual/legislature/public
- Lack of legislative funding champions
- Inertia of human nature
 - Lack of understanding and identification with problem
- Issue is segmented - could be part of solution
 - Hikers, ag, boaters
- Stakeholders may feel threatened and may have conflicts
 - Cooperation among stakeholders
- Some may feel that the battle is lost
 - Failure to educate public on successes
- Lack of coordinated leadership
 - Currently have individual coalitions and organizations
- Conflict over funding priorities and where IS fits in
- Conflict over how to deal with IS - pesticides/herbicides/biocontrol/lethal
- Getting enough \$ to make a difference
- Communicate magnitude of problem
- Develop strategic comprehensive funding approach long-term
 - If you can't get comprehensive → think through approach
- Quantification of the “do nothing” alternative
- The “story” as to why we need to do something
- Economic cost → different options
 - What does it cost to act?
- Overcoming fear of the cost of action
- Who is the “who?”
 - Whose job is it?
- 1) Keep leadership interested
- 2) Keep leadership willing to fund
- 3) Education: “What is my part in this?” - make it personal
- Long-term issue - how do we lay this out so that people engage for the long haul?
- Education - how do I not make the problem worse?

Top priorities:

- 1) Coordinated Leadership
- 2) Funding
- 3) Education
- 4) R&D

Significant obstacles:

- Lack of awareness
- Large geography
- Lack of funding - large scope
 - EDRR
 - Eradication
 - Survey
- Fear of government involvement
 - Libertarian streak
- Lack of clear prioritization - where do we start?

SISKIYOU

Question #2:

- 1) Leadership and Coordination
- 2) Funding
- 3) Education/Outreach personal → legislative
- 4) Science / R&D

1) Leadership and Coordination

- Consolidate decision making
 - Prevention
 - EDRR
 - Management
 - Eradication
 - Restoration - facilitate permitting
- Legislative leadership
- Develop agency coordination
 - Summit is timely
 - Good cross section of entities
 - Need dedicated support
 - Somewhat analogous to salmon
 - OR state government lends itself to scattered funding
 - Office of state invasive species - in office of governor
 - Is there a structure in emergency services that could handle the rapid response?
 - Coordinate and track funding and statewide efforts
- Directive from Governor
 - Source of funding
 - Agencies responsible
- Legislature: Invasive Species Act specific agency authority (OAR) for invasive species
- OISC - could OISC be the board for a new office in Governor's office?

2) Funding

- Fed
- License
- Private industry
- State
- Non-profits
- Foundations

3) Education and Outreach

- Examples: Silent Invasions - Mass Media → Public service announcements
- Brochures → Targeted
 - Boaters, fishers, wood cutters
- Event outreach
- Signage
- *Get an expert on outreach
- Pamphlets
- Billboards
- School curriculum K-12 - statewide requirement
- Extension - Master Gardeners
- Plant Diagnostic Network - OSU
 - Only for diseases now
 - Should be expanded for insects, plants, aquatics, critters

- Master gardeners visit yards and identify IS

4) Science - Research and Development

- Technology Transfer - outreach?
- “New Pest Response Guidelines”
 - Bringing expert knowledge together
- Institute for Natural Resources “as facilitator for” Center of Excellence - Networks for sharing through university system
- Science-based decision making for funding
- Evaluation/development of control measures
- Predicting impacts
- Science of prevention
- Funding - sources are needed
 - Farm bill has a component
- Competitive grants from state/federal funded program
- No-cost legislative and regulatory actions (or rule) that can minimize or mitigate risk (e.g., prohibit hunts for feral swine) (e.g., weed bill - ensure funding is attached)

OCHOCO

Question #1: (Key to S-M-L: S=short-term objectives; M=mid-term objectives; L=long-term objectives)

- Establish goals - Prioritize Goals* (M)
- \$ Emergency fund at state and federal level (S)
- Revenue source: (identify) for funding (M)
- Most people don't care (M)
- Need a spokesperson (M)
- Lack of data management system (M)
 - Collection/management/access
 - Social networks
- Risk assessment and pathway identification (M)
- Priority of lands (high value) (M)
 - High threat invaders
- \$
- Public awareness/education (L)
 - *curriculum development
- Conflicting interests
 - Commerce/control (M)
 - Tools and controls - conflicts
- Baseline assessment (S)
- Lack of coordinated management system - OISC* (S)
- Lost opportunities
- Who are the contacts? Include the NGOs?
- Lack of consistent enforcement/penalty (M)

OCHOCO

Question #2:

- The Czar
 - Fully empowered
 - Funding prioritizations
 - Monitoring and follow-up
 - Reports to the Governor
 - Public entity (OWEB) with board made up of repr. From regulation, industry, NGO, etc.
 - Regional coord. (WA/OR/ID)
- ISC
 - Pick an eradication "win" and implement
 - "visible" problem
 - Use a statewide campaign with high public
 - Use a targeted "array"
 - High priority area with a risk species
- Incident command system
 - QRS - Quick Response Teams
 - Federal emergency response \$\$
 - Need to add state emergency \$
 - Funding coordinated similar to fire model
 - Regional
- Standard database - with ongoing management and operation - university??
- Funding strategies/sources
 - User fees
 - Legislation with enforcement/fines
- Assessments/risks/priorities

- Targeted communication strategy with a compelling driver - make it a personal issue
 - Governor: tells schools to add it to their schools now - not later.
 - OR 150-year publicity to include invasive species.
- ORS 570 - funding and authority “on the ground”; statewide

Final Discussion Comments:

- Form a committee for funding strategies
- All people to taskforce/subcommittee/advisory committee
- Funding for O/E Grants
- Clarify noxious weed listing criteria
- Regional weed lists
- Use existing organizations to educate public, ex., master gardeners
- Don't reinvent the wheel - use existing programs as model
- Clarify roles/responsibilities of agencies and organizations
- Acknowledge positive aspects of state programs

Appendix D—Additional comments and suggestions made by summit attendees post-summit

During the process of editing the document, some attendees commented on some “new ideas” that were not discussed at the summit. These comments were not incorporated into the summit document to ensure that document remains true to what occurred during the summit. These additional comments are listed below.

- One summit participant proposed that, perhaps through OSU County Extension Service Agencies, a volunteer invasive species coordinator could be hired to help the statewide invasive species coordinator. Specifically, this position could assist in county awareness, eradication, and control, if necessary, and generally give the statewide coordinator more timely access throughout the state. The participant felt this would speed up early detection-rapid response, help in a potential county by county inventory of the different invasive species present, and help in the planning for each county’s invasive species presence.
- Another suggestion was to include more volunteers and groups in the state invasive species program. Groups, such as garden clubs, youth groups, invasive volunteer groups, and other interested parties, who become interested in helping could all be included in the overall invasive species programs.
- One summit attendee commented that “normal government processes don't work” when dealing with new reports of invasive species (relative to accessible funding to immediately respond). “If a new invader hits, agencies can't wait to go to the Legislature for funding. We can't do a long environmental assessment or the problem gets out of control before we make a decision. Oregon needs some discretionary funds and the ability to push action decisions to lower levels so we can act before the problem gets more out of control and more expensive.” *[Note: The idea for discretionary funding is not new, and is included in the summit document. However, the blending of discretionary funding while giving consideration to the level of decision-making seemed to warrant listing this comment here.]*
- One attendee noted the public is not very interested in (or sympathetic to) fights between public agencies about responsibility. It’s all “the government” and “they should figure out the right thing to do and do it. That argues in favor of the high level of coordination called for in the report.”

- One of the facilitated groups discussed the need for a logo or mascot that people can rally around and that puts a face on the invasive species campaign; i.e., something like Smokey Bear, Woodsy Owl, or Hitchhiking Spike.