Oregon Invasive Species Action Plan



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Chapter 1

Introduction

Oregon's beautiful lakes, coastal beaches, rugged mountains and unspoiled high desert vistas are national treasures and a source of pride for Oregonians. Diverse plant and animal communities thrive in these ecosystems. Unfortunately, these natural communities and agricultural/horticultural systems are increasingly threatened by invasive species, a form of biological pollution. Harmful, non-native plants and animals are moving in, degrading habitats, displacing desirable species and costing Oregonians millions of dollars annually in control treatments and lost productivity.

Not all non-native species are harmful; in fact, most are beneficial or harmless. Only a small percentage of them are invasive. Though many undesirable pest species already occur in the state, most of the world's worst invasive species, including zebra mussel, gypsy moth and kudzu, are not established in Oregon. This Action Plan is designed to improve our defenses against these alien invaders. It is a daunting task. Most introductions are accidental or are initially thought to be beneficial. It can take many years before populations of invasive species build up to levels that are easily noticeable and begin to cause damage. The window of opportunity for cost-effective eradication is typically narrow and can pass before anyone even recognizes there is a problem.

Once established, invasive species spread relentlessly, each generation taking over more territory like a slow-motion wildfire. Unlike a wildfire, however, invasive species don't die out and permanently alter the environment. They perpetuate themselves in continually expanding colonized areas until they reach the limits of their biological potential. The cost of controlling an invasion rises rapidly as it spreads.

Oregon has a reputation for strong environmental protection. Many existing programs address biological pollution in one form or another and historically there have been some notable successes at eradication of dangerous invasive species. Among the most impressive was eradication of a quarter of a million-acre gypsy moth infestation in the mid-1980's. Unfortunately, existing programs are falling behind due to resource limitations and the rapidly increasing rate of new introductions. A new plan of action is called for to unify and strengthen existing programs and fill in gaps between them. Oregon's diverse ecosystems are worth saving; let's work together to do what needs to be done.

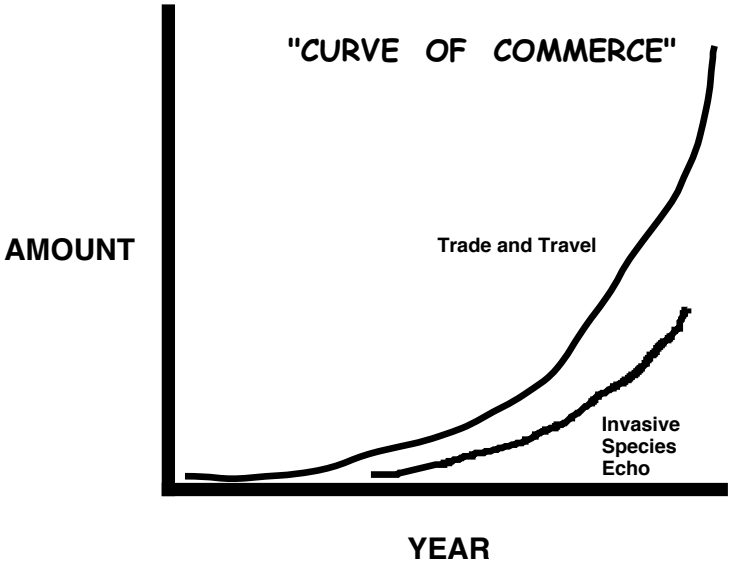
What's Going On?

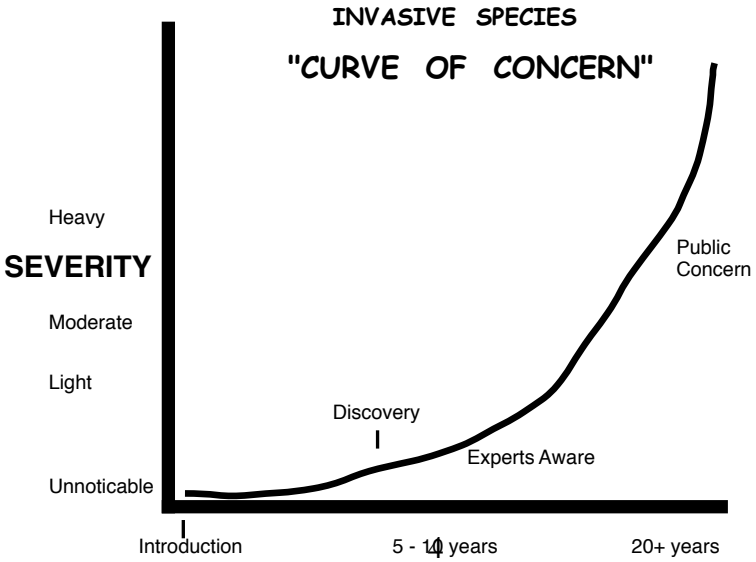
The basis of the invasive species problem can be explained using two simple graphs (see below). The first graph, "Curve of Commerce," illustrates the increase in global trade and travel in recent years which is linked to the increase in the number of hitchhiking organisms traveling around the world. For

example, the number of passengers arriving at PDX jumped from 6.4 million in 1990 to 13.8 million in 2000, a 116% increase. Imported cargo at Portland harbor increased from 2,930 short tons to 4,861 short tons during the same period, a 66% increase.

The second graph, "Curve of Concern," illustrates critical events around a typical invasion. It is often several years after an introduction before an exotic organism is discovered. A decade or more may go by before the population reaches economically or ecologically significant levels. Public concern and pressure to "do something" builds after it is much too late for cost effective eradication.

It is beyond the scope of this document to review the issue of invasive species in depth. Interested readers are referred to related reference material in Appendix I. Definitions of terms used in this document and others relating to invasive species appear in Appendix II.





Oregon Examples

Invasive species threaten not only Oregon, but also all parts of this country and countries around the globe. The globalization of trade and travel has created pathways for species to move rapidly across great distances. Here are a few examples:

1.) Every summer live Japanese beetles, *Popillia japonica*, are found hitchhiking on airplanes at Portland International Airport. Six were trapped nearby in 2004 and others probably escaped detection. This species, originally from Japan where it is a minor pest, was introduced to New Jersey in 1916. It has since spread over half the country and become a major pest of turf and ornamentals. Four times since 1989, incipient populations have been discovered in Oregon. All have been successfully eradicated. Five thousand traps are deployed statewide each year to detect new introductions.

2.) European green crab, *Carcinus maenas*, first appeared in Oregon in 1997. It had been spreading northward from California since 1989. Two hundred years ago these crabs colonized the East Coast, a hundred years ago they found their way to Australia and more recently they have shown up in Tasmania, South Africa and Japan. They are believed to travel as larvae in ship ballast water, as juveniles on fouled hulls of ships and in seaweed used to keep seafood damp during shipment. These crabs feed on young mussels, urchins, cockles, and barnacles (Yamada 2001).

3.) Kudzu, *Pueraria montana*, "the weed that ate the South," had never been found west of the Mississippi until 2000 when it was discovered at two sites in Oregon. Another site was found in 2001. Introduced at the 1876 Centennial Exposition in Philadelphia and widely promoted for erosion control in the 30's and 40's, this vine grows a foot a day and now smothers seven million acres in the South including mature trees and telephone poles (Stewart, 2000). The known sites in Oregon have been treated at a cost of about $10,000, but there may be others as yet undetected.

4.) New Zealand mud snail, *Potamopyrgus antipodarum*, appeared in the Snake River in 1987. A 2002 survey found it to be widespread in Young's Bay (Clatsop County) and in Garrison Lake (Curry County). Additional sites were discovered in 2003. Australia and Europe were invaded long ago. Populations in invaded areas can build up to 700,000 snails per square meter, causing native mollusk and fish populations to suffer. Ballast water or contaminate fresh water tanks are suspected in long distance transport of this snail. Birds and sport anglers inadvertently spread them from drainage to drainage.

5.) Ramorum blight (a.k.a. sudden oak death), *Phytophthora ramorum*, a fatal disease infecting some types of oak trees, appeared in California in 1995. It has since spread to fourteen counties and killed tens of thousands of trees in that state. Nine infested sites were found in Oregon in 2001 just north of Brookings, more have been found in the same area every year since. All of these Oregon sites, totaling 70 acres, have been clear-cut and burned in an attempt to eradicate

the disease. The same pathogen causes leaf spots and twig die back in rhododendron, California bay laurel, huckleberry, redwood, Douglas fir and many other plants. Several European countries have found the disease in nurseries and infestations were found and eradicated at twenty-three Oregon nurseries in 2004 and seven more in 2005 up through mid-June. No one is sure how it spreads long distances in the wild, but movement of nursery stock is a pathway for spread between nurseries. The cost of survey, certification and eradication programs in Oregon has grown to about $750,000/year.

6.) *Inula britannica*, or meadow fleabane, was detected in Oregon for the first time in 2002 at a lily farm. This weed is native to Europe and Asia; it is a serious problem in bulb production in The Netherlands. Root fragments that lodge under bulb scales can produce new plants. Shipments of infested bulbs are thought to spread the weed. Populations were discovered in Ontario in 1928, Quebec in 1979, and Michigan in 1990. Treatment of the Oregon population in 2002 appeared to be successful, but the plants had already set seed so the battle is not over.

These are only a few examples. There were additional incidents in 2004 including: Patterson's curse was found in Douglas Co., two exotic ambrosia beetles were collected in Portland's Forest Park, yellow floating heart was discovered in a Beaverton park, gypsy moth egg masses were found on blue spruce imported from Canada, and brown marmorated stinkbug was detected in Portland. Unfortunately, 2004 was not an unusual year. Oregon is being bombarded with undesirable exotic species. For more details on recent introductions see: Invasive Species in Oregon, Report Card, 2004 [*egov.oregon.gov/OISC*].

Goal

Exclusion, early detection and rapid response are by far the most cost-effective way of dealing with undesirable invaders. The goal of this plan 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. Education and cooperation are key components to an effective strategy.

Invasive Species Council

Statute

Oregon's Invasive Species Council was created by the Oregon legislature (ORS 561.685). Complete text of the statute creating the council can be found online at: [*landru.leg.state.or.us/ors*], under Chapter 561. The council began official business on January 1, 2002.

Functions

The invasive species council statute identifies four main functions for the council. First, the council is directed to create and publicize a system for reporting sightings of invasive species and referring those reports to the appropriate agencies. Second, the council is directed to undertake educational activities to increase awareness of invasive species issues. Third, the statute directs the council to develop this document, a statewide plan for dealing with invasive species. Finally, the council is authorized to administer a trust account for funding eradication and education projects.

Membership

The council consists of twelve members. There are four ex officio members representing the agencies with a lead role in invasive species management: Oregon Department of Agriculture, Portland State University, Oregon Department of Fish & Wildlife, and the Sea Grant College of Oregon State University. The ex officio members appoint eight at large members for two-year terms. The members may represent federal, state, and local governments, universities, industry and other groups having an interest in invasive species. Current members are listed in Appendix IV.

Bylaws

The invasive species council's bylaws are available online at*:* [*egov.oregon.gov/OISC*].

Activities -- 2004

Meetings of the invasive species council occur three times a year. The location varies; in 2004 meetings were held in Keizer (January and June) and Florence (September). Meetings last one to one and a half days and may include a field trip to see invasive species in the area. For information on future meetings, contact the current chairperson.

A centralized, toll-free number has been set up to encourage sightings of all types of invasive species. The number is 1-866-INVADER. Information received in the calls if referred to the appropriate agency for follow-up. Pencils advertising the toll-free hotline number (1-866-INVADER) are available.

An information-sharing network has been set up to connect people and organizations in the state that have an interest in invasive species. Short documents are sent out via FAX. In the future most information will be forwarded electronically. Anyone interested in invasive species in Oregon is invited to join the network by contacting: Shannon Brubaker, ODA Plant Division, 635 Capitol St. NE, Salem, OR 97301; 503-986-4660; [*sbrubake@oda.state.or.us*].

Education and Outreach

The council focused on developing an educational/outreach strategy in 2004. A request for proposals to develop a strategy to increase public awareness of invasive species was prepared. Anthill Marketing was selected and contributions totaling $20,000 were collected to pay for the initial strategy development.

Coordinated Action

Good governance and financial responsibility require a coordinated approach to prevention, detection, planning, and response to invasive species. The Invasive Species Council is in a unique position to encourage partnerships among local, state, federal and tribal agencies, as well as business and non-governmental organizations. The Council should function as a coordinating body to ensure cost-effective responses to invasive species in Oregon. A good example would be development of early detection networks with the goal of training interested persons to look for harmful invaders from the 100 Most Dangerous Invaders list (see Chapter 2).

Awards

In an effort to recognize people and organizations that are making outstanding contributions to protecting the state from invasive species the Council has created five awards:

Eagle Eye Award -- presented to the person or persons reporting the most important sighting(s) of an invasive species.

Winners:

2002: Alice Pfand, New Zealand Mud Snail, Garrison Lake
Scott Rose & Gary Garth, meadow fleabane, Hermiston

2003: Nick Otting & Danna Lytjen, barbed goat grass, Cave Junction
Pat Patterson, decollate snail, Eugene
Gary Weaver, Patterson's Curse, Lebannon

2004: Greg Mazer, yellow floating heart, Beaverton
John Ekberg, Alan Mudge & Christy Brown, gypsy moth eggs, Eagle Creek

Outstanding Defender Award -- presented to the person(s)/organization (non-government) making the most outstanding contribution to protecting Oregon from invasive species.

Winners:

2002: Sandy Diedrich, founder No Ivy League

2003: Mandy Tu, promotion of Codes of Conduct for nursery industry
Project YESS, exceptional service clearing invasive plants from preserves

2004: Marc Cool, production of white papers on grasses including invasiveness
Jonathan Soll & PAPST, heroic efforts to control knotweeds along Sandy River

Ten Fingers in the Dike Award -- presented to the person(s) or unit in a government agency going above and beyond the call of duty to keep new invaders out of the State.

Winners:

2002: Sudden Oak Death Task Force (Alan Kanaskie, Nancy Osterbauer, Everett Hansen, Ellen Goheen) for implementing sudden oak death eradication program

2003: Mary Pfauth, Vanessa Howard & Dennis Isaacson for development of the Spartina Action Plan
Jack Wylie, for support of Oregon's ballast water regulations

2004: Kathleen Johnson, outstanding success at eradicating gypsy moth and Japanese beetle
Jim Athern, promoting aquatic nuisance species prevention
Ken French, 25 years of protecting southwest Oregon from noxious weeds

Invader Crusader Award -- presented to the Oregon student(s) making a difference in protecting Oregon from invasive species.

Winners:
2002: Erik Hanson, PSU, primary author of Oregon's Aquatic Nuisance Species Management Plan
2003: Kim Powell, outstanding participant in Project YESS
2004: No awards

OISC Service Award -- presented to OISC members leaving the Council after one or more complete 2-year terms.

Winners:
2003: Steve Buttrick, The Nature Conservancy, 2002-2003
2004: Blaine Parker, Columbia River Inter-Tribal Fish Commission, 2002-2004
Keith Warren, J. Frank Schmidt & Son Co., 2002-2004
Paul Heimowita, 2002-2004
Richard Mishaga, 2003-2004

Awards are presented at an annual banquet held in conjunction with the winter meeting of the Council. In addition to well-deserved recognition, the awards help increase awareness of invasive species issues in Oregon.

Annual Report Card

An annual report card reviewing the activities of the council, invasive species introductions, eradication projects, etc. will be produced by the council. A review of the state's success at keeping out the 100 most dangerous invaders threatening Oregon will be included. This performance measure will be reported to the Oregon Progress Board (benchmark # 89, which is designed to track the State's success at excluding invasive species), [*egov.oregon.gov/OISC].*

Action Plan

Action plans that are not dynamic lose their usefulness, as they become out-of-date. Keeping this action plan current will be one of the functions of the invasive species council. The most up-to-date version of the action plan will be available online at: [*egov.oregon.gov/OISC].*

Chapter 2

100 Most Dangerous Invaders Threatening Oregon in 2005

The council developed the following list of most dangerous invaders threatening Oregon in 2004. These organisms threaten to invade at any time and available information allows us to predict that they would have serious negative economic or ecological impacts if they were to become established in the state. Eradication should be seriously considered if incipient populations are found. The costs of eradication are likely to be much less than the impacts associated with permanent establishment.

The list of most dangerous invaders threatening Oregon will be updated annually by the council and our record of success or failure at exclusion of these species will be tracked. A list of invasive species already established in the state is available in Appendix III.

Micro-Organisms

alder root rot (*Phytophthora alni*): A soil-borne fungal-like pathogen that attacks and kills members of the genus *Alnus*. The pathogen can be spread by movement of infested soil, water (including streams) and plant materials. The disease is found in the United Kingdom, Austria, France, Germany, The Netherlands, and Sweden. It has not been reported in the U.S. If detected in Oregon, this pathogen would impact the wood chip/paper pulp industries and hardwood industries. It would also adversely affect the environment, especially in riparian areas.

cherry leaf roll virus, cherry leaf roll nepovirus (CLRV): cherry leafroll virus is a disease found infecting woody plants in Europe. There are scattered reports of cherry leaf roll occurring in the United States. There are instances of CLRV occurring in combination with other common cherry viruses such as Prunus necrotic ringspot and prune dwarf viruses. When an interaction occurs between the viruses, the reaction is severe and trees are killed.

chronic wasting disease, CWD prion: Chronic wasting disease is a fatal neurological disease of farmed and wild deer and elk. It is established in the mid-West.

elm yellows, elm yellows phytoplasma: Elm yellows phytoplasma is a disease of elms in the midwestern states where it has caused serious losses. Oregon maintains a quarantine against the introduction of elm materials by nurseries from infected states. The disease is spread by leafhoppers. The value of an elm street tree is estimated to be approximately $10,000.

golden nematode (*Globodera rostochiensis*): A plant-parasitic nematode native to the Andean highlands. Moved with potato germplasm and soil to Europe, Great Britain, Russia, India, and South Africa. Also found in two counties in New York and on Vancouver Is., Canada. Very damaging to potato and tomato and can exist on weeds of the Solanaceae. If detected in Oregon, it would potentially cause the loss of international markets of potatoes, onions, and crops with soil, such as nursery stock. As of December 2002, 105 countries have quarantines against this parasite. Widespread infestation could threaten over $1 billion annually in export sales.

hazelnut bacterial canker (*Pseudomonas avellanae*): A bacterium that attacks and kills hazelnut [filbert] trees. The bacterium is found in Italy, Greece and Denmark. It can move with cuttings, nursery stock and by rain storms. Currently, there are no prohibitions against importing plants from endemic regions. Some cultivars have resistance to this pathogen, but many are killed within two years of infection. Widespread infection in the Willamette Valley could threaten the entire Oregon hazelnut industry.

infectious salmon anemia virus, ISAV: May cause high mortality in salmon farms. Recorded from Norway Scotland, New Brunswick, Nova Scotia, Chile, Faroe Islands and Maine.

oak wilt (*Ceratocystis fagacearum*): A vascular wilt pathogen that infects members of the genus *Quercus*. Members of the red oak group are killed; members of the white oak group are somewhat less susceptible. This fungus is transmitted via root grafts or insect vectors. It is found in the U.S. from the Lake States to Texas and east to Pennsylvania and South Carolina. Oaks are an important component of Oregon's nursery and hardwood timber industries and the environment. Introduction of this disease would potentially affect export sales of host species by the nursery industry. The hardwood timber industry would also potentially incur greater business expenses from meeting international quarantine requirements.

pear trellis rust (*Gymnosporangium fuscum*): This fungus requires two hosts to complete its life cycle. The fungus infects both ornamental and fruiting pears that are grown in the vicinity of its other host, juniper. The organism is subject to regulations dealing with the shipment of materials from infested areas in Canada and the United States. Nurseries grow large numbers of the ornamental pears for sale to homeowners and municipalities for use in their landscapes.

Phtophthora taxon C (*Phytophthora kernovii*): A pathogen discovered in England in 2004. Little is known about the disease, but on some hosts it appears to be more aggressive than *P. ramorum*.

plum pox, plum pox potyvirus (PPV): Plum pox virus is a serious disease of peaches, plums, nectarines. Infected fruits are marked with visual rings and fruit deformities. Aphids transmit the virus. European countries have significant economic losses every year. In October 1999, PPV was found for the first time in North America in Pennsylvania. Its discovery resulted in the establishment of an emergency federal quarantine to limit the movement of fruit and plant materials from the area and the destruction of infested orchards. It is estimated that at least $15 million has been spent on the project to date.

poplar canker (*Xanthomonas populi*): Bacterial canker of poplar is a serious disease that leads to branch and stem dieback or tree death in *Populus* species. It is spread via rain-splash from bacterial ooze on canker surfaces. It has been reported throughout Europe, the United Kingdom, the Russian Federation, and Ireland. There are also unsubstantiated reports of the disease occurring in Pakistan and New Zealand. The federal government considers this a pest of quarantine significance. Introduction of this pest to Oregon would potentially adversely affect the softwood, wood chip, and paper pulp industries. It would also potentially adversely affect the environment in riparian zones critical to fish habitat.

potato cyst nematode *(Globodera pallida*): A plant-parasitic nematode native to the Andean highlands. It has moved with potato germplasm and soil to Europe, Great Britain and New Zealand. Not known in North America. Causes damage similar to the golden nematode and shows an ability to attack golden nematode resistant potato varieties. As of December 2002, 105 countries have quarantines against this parasite. Widespread infestation in Oregon could threaten over $ 500 million in exports.

potato wart (*Synchytrium endobioticum*): A soil-borne fungus that reduces yield and produces large warty growths on tubers and stems. The pathogen is believed to have originated in the

Andean highlands and moved with contaminated soil and tubers. It is found in Europe, Africa, New Zealand and North and South America. It has been found in home gardens in the eastern US, but has been eradicated. It is a highly regulated pathogen, similar to the golden nematode. If detected in Oregon, it would potentially cause the loss of international markets of potatoes, onions, and crops with soil, such as nursery stock.

ramorum canker, sudden oak death (*Phytophthora ramorum*): An aerial-borne fungal-like pathogen that attacks 68 host species in many different plant families. The majority of hosts are trees and shrubs. Depending on the host, the pathogen can cause stem cankers (generally fatal to the host), tip dieback, or leaf blight. Members of the Fagaceae (Beech) family, including oaks and tanoaks, are most susceptible, although several commercially important plants [i.e., *Rhododendron* spp., Douglas fir (*Pseudotsuga menziesii)*, and *Viburnum* spp.] can be infected. It may be spread by rain-splash and/or in infested soil, water, and plant materials. The origin of *P. ramorum* is unknown. It has been reported in the following locations: 13 counties in California, part of Curry Co. in Oregon, Germany, The Netherlands, France, the United Kingdom, Spain, Poland, Belgium and Sweden. *Phytophthora ramorum* is subject to both federal and international quarantines. Widespread infestation would affect natural environments plus the nursery, Christmas tree, specialty forest products, and timber industries in the state.

Sheep Pen Hill virus, carlavirus (BBScV-N): This strain of blueberry scorch occurs primarily in New Jersey and is efficiently transmitted from plant to plant by aphids. In 2000, a very similar virus was found in British Columbia. This 'severe' strain of the virus has the potential to be devastating to the Oregon blueberry industry because it attacks most commercial blueberry varieties and eventually kills the plants.

whirling disease, *Myxobolus cerebralis*: A disease of fish first described in Europe in 1898, now also in South Africa and New Zealand. Introduced to the U.S. in the 1950's. Recent infections have been found in wild fish in Colorado and Montana. Believed to be distributed via stocking. Can be responsible for mortality in hatchery salmonids.

willow watermark disease (*Erwinia salicis*): This bacterium invades the xylem of *Salix* species causing branch dieback and severe staining of the wood. The wood wasp *Sirex noctilio* is believed to be a vector. *E. salicis* can also be spread through inadvertent propagation of diseased willow. It is found in the United Kingdom, Japan, The Netherlands, Belgium, and Austria. Both *E. salicis* and *S. noctilio* are pests of concern to the federal government, although a quarantine has not been adopted. The nursery industry and the environment would potentially be adversely affected by introduction of this pathogen.

Aquatic Plants

African waterweed, *Lagarosiphon major*: Native to South Africa and sold as an oxygenating plant for aquaria and ponds. Discovered in Britain in 1944. Forms thick mats that displace native species.

caulerpa seaweed, *Caulerpa taxifolia*: A green algae native to tropical seas. Escaped from a Monaco Oceanographic Museum in 1984 and now blankets many thousands of acres of the Mediterranean. Two populations in California are under eradication. Water temperatures on the south coast would support this species. Not known from the wild in Oregon, though it is a popular aquarium species.

cordgrasses, *Spartina spp.*: Native to the East Coast, these grasses colonize mudflats and convert them to saltmarshes. Intoduced to Willapa Bay, WA in 1894, now infesting approximately 25,000 acres there. Also established in Puget Sound and San Fransisco Bay. An infestation in Tillamook Bay was eradicated; a Cox Island infestation is still under eradication. Mudflats are critical for many types of shellfish and birds.

dead man's fingers, *Codium fragile tomentosoides*: This subspecies is probably Japanese in origin. It has invaded the north Atlantic, Mediterranean, Austrialia, New Zealand and San Francisco

Bay. Historically, new outbreaks have been associated with trade of oysters and shellfish. Displaces native species.

European water chestnut, *Trapa natans*: Native to Eurasia, introduced to Australia and northeastern North America. Dense surface mats impede boating and displace native species. Spiny fruits are hazardous to bathers.

giant salvinia, *Salvinia molesta*: Native to Brazil, discovered in 1998 in the U.S. and now found in seven states including California. Grows rapidly and forms dense mats that interfere with recreation, irrigation, drainage, etc. Also shades native vegetation and reduces dissolved oxygen. Sold as a pond plant and transported on boats and trailers.

golden algae, *Prymnesium parvum*: Releases a toxin that causes fish kills in Europe and the Middle East. Now established in the U.S. Caused large fish kills in Texas in 2001.

hydrilla, *Hydrilla verticillata*: Imported from Asia in the 1950's for use in aquariums, introduced to the wild in Florida. Now established in several states including Washington and California. Clogs irrigation and drainage canals, interferes with recreation, displaces native vegetation and damages sportfish populations. Transported on boats and trailers.

toxic cyanobacteria, *Cylindrospermopsis raciborskii*: Cosmopolitan bluegreen algae that produces a toxin implicated in a range of animal and human health issues.

yellow floating heart (*Nymphoides peltata*): Native to Eurasia and the Mediterranean region, this perennial resembles water lilies, but is capable of crowding out other plants and carpeting the water surface. Sold as an ornamental for water gardens. Reported from a park in Beaverton in 2004.

Land Plants

African rue, *Peganum harmala*: Native to northern Africa, the Middle East and southwest Asia. African rue was introduced into the United States in 1928 to New Mexico. It is now established along roads and dry rangelands in western Texas, New Mexico, Arizona, and California. In the northwest sites have been detected in two counties in Washington and one site found in 1967 in Crook County, Oregon which is currently subject to an eradication effort. This invasive weed is extremely drought tolerant and has toxic alkaloids that can cause poisoning to cattle and sheep.

camelthorn, *Alhagi pseudalhagi*: This is a weedy perennial shrub that is native to the Mediterranean region and western Asia. Camethorn is an invasive plant that is very difficult to control. It aggressively invades disturbed areas, dry land areas and the spiny nature of the plant causes injury to livestock, wildlife and humans. It has been detected in both Nevada and Washington. Not currently known from Oregon.

cape ivy, *Senecio mikanioides*: A South African weed spreading in coastal California. Three small infestations are known from southwestern Oregon.

coltsfoot, *Tussilago farfara*: A low growing perennial native to Europe, northern Africa, and parts of Asia. Found occasionally in the Pacific Northwest associated with ornamental plantings. It is a weed of agriculture fields, roadsides, and wastelands of eastern Canada and northeastern states.

giant hogweed, *Heracleum mantegazzianum*: Native to Asia, introduced to Europe and the U.S. in the twentieth century as a curiosity in arboretums and private gardens. It soon escaped and became naturalized in many surrounding riparian and urban sites. In the northwest extensive infestations occur in northern Washington and the first site was detected in Oregon in 2001 and there are now an estimated 86 sites primarily located in the Portland Metro area of northwest Oregon. This plant is also a human health concern because toxic sap can cause severe skin blistering and scarring.

giant reed grass, *Arundo donax*: A large bamboo-like weed, now problematic in California.

goatgrasses, (barbed, ovate), *Aegilops triuncialis, A. ovata*: Eurasian species that readily cross with wheat causing lowered quality. An infestation of barbed goatgrass was discovered near a bridge construction site in Cave Junction in 2003; an eradication program was implemented.

hawkweeds, (king-devil, meadow, mouse-ear, orange, yellow), *Hieracium piloselloides, H. pratense, H. pilosella, H. aurantiacum, H. floribundum*: A complex of five species, hawkweeds are very weedy and invasive in the United States. They are perennial herbs with fibrous roots that reproduce both by seeds and root fragments. All five species are native to central and northern Europe. This hawkweed complex has been weedy in the eastern U.S. and Canada and more recently has become a major problem in Montana, Idaho, Washington and Oregon. This hawkweed complex impacts pastures, abandoned farm land and mountain meadows. There are currently limited infestations in northeast and northwest Oregon.

kudzu, *Pueraria lobata*: This weed is a native to Asia and is a major invasive weed of the southeastern United States where it has been documented to grow up to one foot per day and covers an estimated seven million acres. This vine overtops and smoothers mature trees and other desirable vegetation and man-made structures. In 2000, two sites were detected in Oregon, the first detections west of the Mississippi. In 2001, two additional kudzu sited were detected, one in Oregon and one in Washington. Kudzu was widely promoted in the southern U.S. for erosion control in the 1930's and 40's. The known sites in Oregon have been treated, but there may be others as yet undetected.

matgrass, *Nardus stricta*: This is a stiff-leaved perennial grass that is regarded as a weed in its native range in Europe. It is a species of low palatability and is difficult to control. Matgrass has the potential to outcompete desirable grasses in pastures and rangeland. There is only one known infestation in Oregon located in Klamath County near Fort Klamath. This site has been under treatment by the landowner, Klamath County and the Oregon Department of Agriculture since the 1970's in an effort to eradicate this weed.

mile-a-minute weed, *Polygonum perfoliatum*: A fast-growing vine spreading in mid-Atlantic states. One early record from Oregon indicates that an introduction did not result in a permanently established population.

Paterson's curse, *Echium plantagineum*: Native to western Europe and the Mediterranean region, this weed is problematic in Australia. It was discovered in a roadside wildflower planting near Lebanon in 2003; a second site was discovered in Douglas County in 2004. Both infestations are under eradication.

Portugese broom, *Cytisus striatus*: A weed similar to Scotch broom but it grows larger in Oregon. Populations in Douglas County have been put under a containment/eradication treatment program.

purple nutsedge, *Cyperus rotundus*: Purple nutsedge was introduced from Eurasia and is often called the "world's worst weed." It is commonly found in Arizona and southern California, in turf, ornamentals, cultivated fields, and ditch banks. It is not established in Oregon.

silverleaf nightshade, *Solanum elaegnifolium*: Is a native to the southwestern United States and northern Mexico. Silverleaf nightshade is a problem weed in both in its native range and in other semiarid regions of the world, including Australia, Egypt, Greece, India, Israel, Rhodesia, South Africa and Sicily. There are twenty-one states that have declared it a noxious weed due to its toxicity, reduction in crop yields and its ability to serve as an alternate host to pests and diseases. In the northwest, infestations occur in Idaho and Washington and it has been detected in Oregon though there are not any current known infestations.

skeletonleaf bursage, *Ambrosia tomentosa*: This weed is a native to the south central Great Plains of the United States. It is a long-lived perennial that reproduces both by seeds and adventitious shoots. It is a problem in croplands of southern Idaho and one infestation has been detected in Washington. It has not been detected in Oregon.

squarrose knapweed, *Centaurea virgat*a: This weed is a long-lived perennial and is native to southwest Asia and the Middle East. It became weedy in northern California and in the 1950's and was associated with rangeland sheep production. In 1988, it was detected in Grant County Oregon and infests a 600 acre area. Another small site was detected in Malheur County; both sites are under intensive control. A third site was detected in Jefferson County in 2003.

starthistles (Iberian, purple), *Centaurea iberica, C. calcitrapa*: Purple starthistle is native to the Mediterranean region, southern Europe and northern Africa and is very similar to Iberian starthistle. Both species infest range, pasture and roadsides in the northwest. These plants are very invasive and have sharp rigid spines that exclude humans and grazing animals. There are populations in California and limited infestations in Washington. In Oregon, there have been reports in both Jackson and Sherman counties where it was eradicated. An infestation detected in 1990 in a Clackamas County pasture is currently under intensive control with the goal of eventual eradication.

Syrian bean-caper, *Zygophyllum fabago*: This weed is a long-lived perennial and is native to southwest Asia and the Middle East. This is an invasive plant of rangelands and forms large bushes three feet or more across. In the United States, infestations occur in Washington, Idaho, California and Colorado. Currently there are no sites reported in Oregon.

Texas blueweed, *Helianthus ciliaris*: This weed is a creeping perennial and is a native to the southwestern United States and can be found in both cropland and disturbed areas. Texas blueweed has spread into Kansas and California. Infestations occur in Idaho and Washington. There are no reported sites in Oregon.

thistles (plumeless, smooth distaff, woolly distaff*), Carduus alanthoides, Carthamus baeticus, Carthamus lanatus*: Plumeless thistle is a winter annual or biennial plant that can be very invasive in rangelands. This thistle is a native to Europe and Asia and is found in pastures, stream valleys and roadsides in Idaho, Colorado and Wyoming. In Oregon it is only known to occur in Grant County where it is under intensive treatment. Woolly distaff thistle is a winter annual native to the Mediterranean region of Europe. It is extremely invasive in pasture and range areas of Australia and in California. In Oregon, it has only been reported in Douglas and Josephine counties where it is thought to have been introduced from California via livestock. The Oregon infestations are under intensive control and populations have been reduced by an estimated 95 percent over the last 15 years. Smooth distaff thistle, another winter annual, is native to the Mediterranean region of Europe; it has not been reported in Oregon.

Aquatic Invertebrates

Asian clam, *Potamocorbula amurensis*: Introduced via ballast water to San Francisco Bay in 1986, now reaching densities of 50,000 clams per square meter. It alters food-web dynamics, and is not known from the Oregon coast.

Asian tapeworm, *Bothriocephalus acheilognath*: An Asian parasite of fish, introduced to the U.S. around 1960, and several European countries in the 70's and 80's. It can weaken or kill hosts and make game fish unsuitable for consumption.

fishhook waterflea, *Cercopagis pengoi*: Native to the Caspian and Black Seas, this species was discovered in the Great Lakes in 1998. It preys on smaller zooplankton, reducing food for native fish.

Japanese shore crab, *Hemigrapsus sanguineus*: Native to Asian Pacific coasts, discovered in New Jersey in 1988 and now distributed from Maine to North Carolina. An omnivorous species which has an appetite for youg clams, scallops, oysters, algae, fish larvae, etc. Displaces native crabs in the rocky intertidal zone.

Japanese oyster drill, *Ceratostoma inornatum*: Introduced to Washington with Pacific oysters imported from Japan in the early 1900's. A limited population is established in Netarts Bay. A pest of oyster beds, it causes mortality up to 25%.

Leidy's comb jelly, *Mnemiopsis leidyi*: Native to the East Coast and introduced to the Black and Caspian Seas. These jellyfish reproduce rapidly and compete with native fish for zooplankton food.

mitten crabs, *Eriocheir spp.*: Native to China and Japan. First collected in San Francisco Bay in 1993. By 1998, 30,000 per day were collected at a bay area pump station. These crabs migrate hundreds of miles up freshwater rivers. One adult mitten crab was caught in the lower Columbia in 1997, another was reported on the 1-866-INVADER hotline in 2001, but could not be confirmed.

New Zealand isopod, *Sphaeroma quoyanum*: Native to New Zealand, this organism arrived in San Francisco Bay early in the 20th century. In 1995 it was detected in Coos Bay, Oregon. This isopod bores into wood, peat, sandstone and styrofoam.

New Zealand sea slug, *Philine auriformis*: A New Zealand species now established along the California coast. It can become the dominant marine organism on soft bottoms. This sea slug feeds on bivalves and other mollusks. It is thought to have been introduced in ballast water.

quagga mussel, *Dreissena bugensis*: Native to the Ukraine, this mussel likely entered the Great Lakes through discharged ballast water from a foreign ship. It has now spread to Michigan, New York, Ohio and Pennsylvania. Impacts are similar to zebra mussel.

rusty crayfish, *Orconectes rusticus*: Native to the Ohio river basin, this species is now spreading in northeast and northcentral states. It is a large aggressive species that can displace native crayfish and reduce aquatic vegetation. Used as bait and is spread by anglers.

sea squirt (*Didemnm lahillei*): A colonial tunicate species that is an aggressive invader and a threat to a variety of marine life including commercial shellfish fisheries. Native to Europe, it has now established in New England and California. Where it has no natural enemies, it grows rapidly in size, taking over underwater real estate and smothering out native species. Found in Edmonds, Washington in 2004 triggering an eradication program.

spiny waterflea, *Bythotrephes cederstroemi*: Native to northern Europe, introduced to the Great Lakes in the mid-'80s. Though barely one centimeter long, this zooplankton species reproduces rapidly and competes with young fish for food.

veined rapa whelk, *Rapana venosa*: Native to the Sea of Japan and now established in Chesapeake Bay. A predatory species that attacks oysters, clams and mussels.

zebra mussel, *Dreissena polymorpha*: Native to Caspian and Black Seas. Hitchhikes on boats and in ballast water. Large numbers build up on grates, intake pipes, outboard motors and similar surfaces. Introduced to the Great Lakes in the mid-80's, now present in 20 states in the Mississippi River drainage.

Land Invertebrates

Africanized honey bee, *Apis mellifera scutellata*: Native to southern Africa. Brought to Brazil in 1956; spread north, reaching Texas in 1990. Now established in New Mexico, Nevada, Arizona and southern California. Much more aggressive than European honeybee varieties. Stings can be life-threatening to individuals allergic to them.

Argentine ant, *Linepithema humile*: Native to South America. Excludes native ant species and is a household pest. One Oregon record from a Jackson County campground in 1999. A follow-up survey was negative.

Asian longhorned beetles, *Anoplophora glabripennis*, *A. chinensis*: *A. glabripennis* are species frequently intercepted in solid wood packing material. Infestations were discovered in New York in 1996, Chicago in 1998 , New Jersey in 2002 and in Toronto in 2003. Eradication projects involve destruction of all hardwood trees in infested areas. *A. chinensis* is a related species intercepted in Georgia in 1999 and it was discovered in imported bonzai in Washington in 200l. Eradication involved destruction of all hardwood trees within 1/8 mile of the importing nursery.

blueberry maggot, *Rhagoletis mendax*: A serious pest of blueberries in northeastern and northcentral U.S. Maggots develop in the fruit.

brown spruce longhorn beetle, *Tetropium fuscum*: A Eurasian species introduced to Nova Scotia where it has killed a large number of spruce trees.

decollate snail, *Rumina decollata*: A polyphagous species that consumes both plant material and other snails. This species has been promoted as a biological control agent in areas heavily infested with European brown garden snail in California. Found for sale at a Eugene garden center in 2003.

emerald ash borer, *Agrilus planipennis*: An Asian flat-headed woodborer that attacks and kills ash trees. Now established in Michigan.

European chafer, *Rhizotrogus majalis*: A European species introduced to New Jersey in 1940, now widely distributed in the eastern U.S. Grubs are serious pests of turf, grains, hay and pastures.

European corn borer, *Ostrinia nubilalis*: Introduced to Massachusetts from Europe in 1917, spread to Illinois by 1939, Nebraska by 1944 and South Dakota by 1946. Pest of corn and many other vegetable crops.

European wood wasp, *Sirex noctilio*: A European species that invaded Uruguay in 1986 and Brazil in 1988. The larvae bore in the trunks of pines.

glassy-winged sharpshooter, *Homalodisca coagulata*: Native to the southeastern U.S., discovered in California in 1990. Transmits Pierce's disease to grapes. Seven specimens were trapped in 2000 at Oregon nurseries importing plants from California.

gypsy moths (European, Asian, pink, nun moth) *Lymantria dispar, L. mathura, L. monacha*: Gypsy moths are native to Europe and Asia. The European variety was introduced to Massachusetts in 1868 and is now established throughout the Northeast. It is one of the worst pests of deciduous forests. Oak and poplar are preferred hosts, but hundreds of other species may be defoliated. Annual statewide trapping detects new introductions every year. Eradication projects have been conducted almost every spring since the 1980's. The Asian variety has been detected twice in the Portland area; both times it has been eradicated. Pink gypsy moth is a Japanese species. An egg mass was intercepted in Oregon on a grain ship in 1991. It has a large host range similar to gypsy moth. Nun moth is a Eurasian defoliator of conifers; it has a wide host range.

imported fire ant (red, black), *Solenopsis invicta, S. richteri*: South American species with a painful sting. Red imported fire ant is established in the Southeast and southern California. It displaces native ants and interferes with agriculture. Intercepted in Oregon in 1992 and 2001. Black imported fire ant is established in parts of eastern and central U.S.

Japanese beetle, *Popilla japonica*: An Asian species introduced to New Jersey in 1916, now present in most eastern and central states. Grubs damage turf; adults feed on grapes, roses, fruit trees and hundreds of other hosts. Four incipient populations have been eradicated in Oregon, beetles are found every year on aircraft at PDX.

Japanese cedar longhorned beetles, *Callidiellum fufipenne, C. villosulum*: Asian wood-boring species transported in solid wood packing material and the wooden trunks of artificial Christmas trees.

khapra beetle, *Trogoderma granarium*: An Indian species widely established in the Old World; one of the world's most destructive pests of grain products and seeds. Not known from North America.

Mexican bean beetle, *Epilachna varivestis*: Originally from Mexico, now established throughout the U.S. except the Pacific states. A pest of beans and other legumes.

old world bollworm, *Helicoverpa armigera*: A pest of corn and many other vegetables in Africa and Australia.

Oriental beetle, *Anomala orientalis*: An Asian scarab beetle established in the eastern U.S.

plum curculio, *Conotrachelus nenuphar*: A pest of apples, pears and stone fruits in eastern U.S.

pine shoot beetle, *Tomicus piniperda*: Native to Europe, Asia and North Africa. Introduced to Ohio in 1992, now established in eight states and two Canadian provinces. Pest of pines, especially Scots pine. Caused considerable mortality in 1998 in southwestern Ontario.

red haired pine bark beetle, *Hylurgus ligniperda*: A European species frequently intercepted in solid wood packing material. Established in Africa, Asia, and South America. Found in a New York Christmas tree plantation in 2000. A pest of pines.

sawyers, *Monochamus urussovi, M. alternatus*: Asian longhorned beetles that attack conifers. Both species were intercepted at the Port of Portland in 2002.

Siberian moth, *Dendrolimus superans*: A Siberian species that defoliates spruce, larch and fir. Not known from Oregon.

silver Y moth, *Autographa gamma*: A European caterpillar pest of many crops.

spruce bark beetle, *Ips typographus*: A pest of spruce from Europe and North Africa.

Fish

Asian carp (bighead, silver), *Hypophthalmichthys nobilis, H. molitrix*: Bighead carp was imported from China in 1973 to improve water quality in aquaculture ponds; it has since escaped into Midwestern rivers. It is a large, prolific species that could impact other species and disrupt native river ecosystems. Silver carp was likewise introduced for aquaculture and has since escaped into rivers in the central U.S.

Atlantic salmon, *Salmo salar*: Native to the North Atlantic, this species is widely used in the aquaculture industry. Escapees from net pens have been detected in British Columbia and Puget Sound. They could compete with native salmon if they were to become established in the Pacific Northwest.

black carp, *Mylopharyngodon piceus*: Introduced from China, this species feeds on mollusks. It is used in aquaculture ponds in Arkansas and Mississippi.

muskellunge, northern pike, *Esox spp.*: Native to the lakes and rivers of the central U.S. Voracious predators; prized as game fish. Can negatively impact native fish.

round goby, *Neogobius melanostomas*: Introduced to the Great Lakes via ballast water prior to 1990. Feeds on native fish. Not known from Oregon.

ruffe, *Gymnocephalus cernuus*: A Eurasian species introduced into Lake Superior in the mid-80's via ballast water. Populations are expanding rapidly. Considered a serious threat to commercial and sport fishing.

Shimofuri goby, *Tridentiger bifasciatus*: An Asian species introduced to California in 1985, probably via ballast water. Competes with native species in estuaries.

snakeheads, *Channa* spp.: Asian fish sold live in ethnic food markets. A population of northern snakeshead, *C. argus*, was found established in a Maryland pond in 2002. This fish can live for days out of water. They are predatory species capable of impacting native fish populations and disrupting natural ecosystems.

Birds

mute swan, *Cygnus olor*: Native to Europe and Asia and introduced to parts of the U.S. These big, impressive birds are spreading in the wild and competing with native species.

Mammals

feral swine, *Sus scrofa*: Populations of European boars, escaped barnyard pigs and their hybrids live in the wild in half the states of the U.S. They are very adaptable and reproduce rapidly. Their feeding damage in wild areas resembles rototilling and promotes growth of noxious weeds. Feral swine act as disease reservoirs for swine brucellosis and pseudorabies. The total wild population in Oregon is thought to be less than a thousand in 2004 with the largest number in Wasco County. Suitable habitat can be found throughout the state. Hunting laws have been loosened and two control areas requiring eradication have been created, but compliance has not been 100%. Wild pigs are a popular game animal for hunters. In California, hunters harvest about 40% each year, but populations continue to grow unless 70% or more are removed from each generation.

Chapter 3

Potential Economic Impacts

Estimating the potential economic impact of a new invader is an inherently difficult and inexact exercise. The figures in the first table below are based on economic studies for control of species already established in Oregon or elsewhere in the U.S. Figures in table 2 are estimates of potential impacts based on risk analyses. Ecological costs are even harder to document or estimate. Better definition of the potential impacts of organisms on the 100 Most Dangerous Invaders list is needed. It is clear, however, from the examples below that the economic impacts of invasive species can be substantial; therefore the cost/benefit ratios for exclusion programs are generally extremely favorable. Lovell & Stone (2005) completed a literature review of studies documenting the economic impacts of aquatic invasive species.

all invasive species	Pimentel et al. 2000	$138 billion/yr to U.S.
invasive plants	Westbrooks 1998	$13 billion/yr to U.S.
zebra mussel	OTA 1993	$3.1 billion/10 yrs to U.S.
Asian longhorned beetle	USDA, APHIS 2000	$25 million/5ys to NY, IL
Scotch broom	Radke & Davis 2000	$47 million/yr to OR
tansy ragwort	Radke & Davis 2000	$4.5 million/yr to OR
yellow starthistle	Radke & Davis 2000	$3.5 million/yr to OR
Brazilian elodea	Radke & Davis 2000	$4 million/yr to OR
whitetop	Radke & Davis 2000	$12 million/yr to OR
Japanese beetle/fire ants	USDA-APHIS 1998 Thompson 2001	$2.6 billion/yr to U.S.

Table 1. Economic impacts of some established invasive species.

Asian gypsy moth	USFS 1992	$4.3 billion/40 yrs to western U.S.
sudden oak death	Osterbauer 2003	$30 billion to U.S. commercial timber
Spartina spp.	Radke & Davis 2000	$17.5 million/yr to OR
purple starthistle	Radke & Davis 2000	$8 million/yr to OR
distaff thistle	Radke & Davis 2000	$4.5 million/yr to OR
hawkweeds	Radke & Davis 2000	$12.5 million/yr to OR

Table 2. Estimated potential economic impacts of some invasive species that threaten Oregon.

Related Documents

This action plan incorporates by reference information contained in five related documents: The National Invasive Species Management Plan, Oregon's Aquatic Nuisance Species Management Plan, Oregon's Noxious Weed Strategic Plan, Oregon's Wildlife Integrity Rules, and Oregon's List of Approved Insects. Excepts and online references follow.

Meeting the Invasive Species Challenge, Management Plan, National Invasive Species Council, January 18, 2001

Excerpts from the Executive Summary:
"Invasive species affect each of our lives, all regions of the U.S., and every nation in the world. Society pays a great price for invasive species -- costs measured not just in dollars, but also in unemployment, damaged goods and equipment, power failures, food and water shortages, environmental degradation, increased rates and severity of natural disasters, disease epidemics, and even lost lives. Stimulated by the rapid global expansion of trade, transport, and travel, invasive species and their costs to society are increasing at an alarming rate."

"The [National Invasive Species] Council (specifically, the eight department members) is to: provide national leadership on invasive species; see that their federal efforts are coordinated and effective; promote action at local, state, tribal and ecosystem levels; identify recommendations for international cooperation; facilitate a coordinated network to document and monitor invasive species; develop a web-based information network; provide guidance on invasive species for Federal agencies to use in implementing the National Environmental Policy Act; and prepare the Plan -- this document."

Full text of the National Invasive Species Plan is available online at: [*www.invasivespecies.gov/council/nmptoc*].

Oregon Aquatic Nuisance Species Management Plan

Excerpts from the Executive Summary:
"Aquatic Nuisance Species (ANS) are a serious problem in Oregon. There are currently over 134 nonindigenous aquatic species reported in Oregon. More species are expected to arrive. Current state activities and authorities address some ANS, their prevention, and control. Yet the activities are not coordinated or comprehensively managing the impacts of ANS. The importance of Oregon's aquatic resources requires a coherent response to the threat posed by ANS. This management plan is the initial step in establishing a program in Oregon to specifically address ANS issues."

"The goal of the Oregon Aquatic Nuisance Species Management Plan is to: minimize the harmful ecological, economic, and social impact of ANS through

prevention and management of introduction, population growth, and dispersal of ANS into, within, and from Oregon."

Full text of the Oregon Aquatic Nuisance Species Management Plan is available online at: [*www.clr.pdx.edu/publications*].

Oregon Noxious Weed Strategic Plan

Excerpts from the Executive Summary:
"Oregon is under siege. The invaders have names such as diffuse knapweed, yellow starthistle, leafy spurge, and purple loosestrife. They are noxious weeds, exotic species that don't belong here. Numerous agencies and programs have been enlisted to fight the battle. Without those efforts, the invaders will win, crowd out native plant species, and overrun the landscape."

"Oregon loses more than $83 million annually to just 21 of the 99 state-listed noxious weeds. These invasive, non-native plants choke out crops, destroy range and pasture lands, clog waterways, affect human and animal health, and threaten native plant communities."

"During the last 10 years, the number of state-listed noxious weeds in Oregon has increased by 40 percent. The recent detection of two aggressive invasive weeds, kudzu and smooth cordgrass, has sounded a serious alarm about new invasions. Also alarming is the spread of established weeds. During the past 12 years, infestations of spotted knapweed and yellow starthistle have expanded 42 and 11 fold, respectively. Without immediate action, these trends will continue."

Full text of the Oregon Noxious Weed Strategic Plan is available online at: [*egov.oregon.gov/ODA/PLANT/weed_index.shtml*].

ODFW Wildlife Integrity Rules

Excerpts:
"The purpose of these rules is to protect Oregon's native wildlife. These rules aim for this goal by regulating human actions involving nonnative wildlife (whether those actions involve trade in nonnative wildlife or involve interaction with nonnative species in the wild). The rules allow private use or ownership of nonnative species to the extent that they do not pose a significant risk of harm to native species."

Excerpts from ODFW Backgrounder: Protecting the Integrity of Oregon's Native Species:
"How do the rules work? Exotic species are placed in one of three categories, based on their potential to harm native wildlife. These categories are: Prohibited, Noncontrolled, and Controlled. As of January 2000, over 16,000 species had been placed in one of these three categories." "Finally, several hundred exotic species were declared "Domestic or Otherwise Exempt."

Examples of Prohibited species: European hedgehogs, snakehead fish, and Egyptian goose. Examples of Controlled species: Pacific oyster, grass carp, and game birds. Examples of Non-controlled species: yellow canary, spectacled salamander, mud turtles and elephants. Examples of Domestic or Otherwise Exempt species include cats, dogs, hamsters, horses, sheep, cattle, etc.

OAR 635-056-0040: "For species, subspecies or hybrids listed as Prohibited or those species not yet classified, a permit will not be issued allowing the importation and possession of live wildlife, except to American Zoo and Aquarium Association (AZA) accredited facilities, colleges, universities and those facilities which can demonstrate compliance with standards as provided in OAR 635-056-0050(2). For species, subspecies or hybrids listed as Controlled, an importation permit may be required as set forth by the commission. For species, subspecies or hybrids listed as Noncontrolled, no ODFW importation permit is required."

Full text of ODFW's wildlife integrity rules are available at: [*www.dfw.state.or.us/wildlife/diversity/integrity.asp*].

ODA List of Approved Insects

The Oregon Department of Agriculture maintains an advisory list of insects that are approved for sale and release in the state. The complete list is available online at: [*egov.oregon.gov/ODA/PLANT/ippm_appr_insects.shtml*]. The State does not require permits for importing insects, but in most cases, a USDA permit is needed for moving live insects across state lines.

Legal Authority To Act

Existing Legal Authority

ODFW

The Department of Fish and Wildlife authority to manage wildlife to prevent serious depletion of any indigenous species is contained in various parts of ORS 496, 497, and 498.

> ORS 496.012: "Wildlife policy. It is the policy of the State of Oregon that wildlife shall be managed to prevent serious depletion of any indigenous species and to provide the optimum recreational and aesthetic benefits for present and future generations of the citizens of this state."
>
> ORS 496.004: ""Wildlife" means fish, wild birds, amphibians, reptiles and feral swine as defined by State Department of Agriculture rule and other wild mammals."

ORS 498.052: "No person shall release within this state any domestically raised wildlife or wildlife brought to this state from any place outside this state unless the person first obtains a permit therefor from the State Fish and Wildlife Commission."

ORS 498.222: "No person shall: (a) Transport any live fish unless the person has first obtained a permit therefor from the State Fish and Wildlife Commission. (b) Release or attempt to release into any body of water any live fish that was not taken from that body of water, unless the person has first obtained a permit therefore from the commission."

ORS 498.234: "The State Fish and Wildlife Commission shall, by rule, establish a program to protect all finfish and shellfish in waters of this state, both public and private, from infection by the introduction of detrimental fish diseases."

ODA

Various parts of ORS 561, 570, 571 give the Department of Agriculture authority to implement quarantines, eradication/control projects, weed control districts and control area orders. These powers are best summarized in the following two sections:

ORS 570.305: "Department officials to prevent introduction of pests and diseases. The Director of Agriculture, and the chief of the division of plant industry, are authorized and directed to use such methods as may be necessary to prevent the introduction into the state of dangerous insect pests and plant diseases, and to apply methods necessary to prevent the spread, and to establish control and accomplish the eradication of such pest and diseases, which may seriously endanger agricultural and horticultural interests of the state, which may be established or may be introduced, whenever in their opinion such control or eradication is possible and practicable."

ORS 570.505: "Necessity of eradication of weeds; cooperation in control and eradication. Noxious weeds have become so thoroughly established and are spreading so rapidly on state, county and federally owned lands, as well as on property in individual ownership and in transition to county ownership through tax delinquency, that they hereby are declared a menace to the public welfare. While it is recognized that complete eradication may not be practicable, it hereby is established that steps leading to eradication and control are necessary and that responsibility rests not only on the individual landowner and operator but also on the county, state and federal government, and that the county, state and federal government should cooperate with individual owners in the control and eradication of noxious weed pests."

OAR 603-052-0030 to 603-052-1200 include quarantines and control area orders regulating importation of the following: plum curculio, grape plants, chestnut blight, Dutch elm disease and elm yellows disease, blueberry maggot, peach yellows phytoplasma, peach rosette phytoplasma, oak wilt, apple maggot, European corn borer, Japanese beetle, brown garden snail and other phytophagous snails, European pine shoot moth, apple ermine moth, cherry fruit fly, San Jose scale, codling moth, pear pyslla, peach twig borer, Western peach tree borer, oblique banded leafroller, apple scab, *Coryneum* blight, fire blight, peach leaf curl, twig borer, shot hole borer, Oriental fruit moth, mint *Verticillium* wilt, onion white rot, onion yellow dwarf, onion maggot, halo blight, common bean blight, fuscous blight, brownspot, bean bacterial wilt, various potato diseases, white top, Russian knapweed, skeleton weed, cherry bark tortix, black stem rust, powdery mildew of hops, rough bluegrass, creeping annual bluegrass and noxious weeds (101 species).

Ballast Water

In 2001, the Oregon legislature enacted a law to regulate ballast water releases. Excerpts follow:

ORS 783.635: "(1) Except as authorized by this section, the discharge of ballast water in the waters of this state is prohibited. (2) An owner or operator of a vessel may discharge ballast water in the waters of this state: (a) If the owner or operator has conducted an open sea exchange, or a coastal exchange, if applicable, of ballast water prior to entering the waters of this state; or (b) Without performing an open sea exchange or a coastal exchange of ballast water if the owner or operator reasonably believes that an exchange would threaten the safety of the vessel or if the exchange is not feasible due to vessel design limitations or equipment failure. (3) An owner or operator who discharges ballast water in the waters of this state under subsection (2)(b) of this section is subject to the reporting requirements under ORS 783.640."

ORS 783.640: **"**(1) Owners or operators of vessels regulated under ORS 783.630 to 783.640 must report ballast water management information to the Department of Environmental Quality at least 24 hours prior to entering the waters of this state. The department may work with maritime associations to establish the manner and form of such reporting. (2) The department may verify compliance with ORS 783.630 to 783.640 by relying on tests conducted by the United States Coast Guard or on other tests determined to be appropriate by the department."

Gaps in Legal Authority

Oregon's legal authority for dealing with invasive species isn't perfect, but it is relatively strong. Enforcement is a bigger problem. State agencies do not have the staff or resources to monitor trade and travel regulated by these statutes.

A broad interpretation of the laws which authorize state agencies to prevent depletion of indigenous species, prevent the introduction of dangerous insect pests and plant diseases, and prohibit the discharge of ballast water would appear to allow most exclusion, rapid detection and eradication programs aimed at undesirable invasive species. A technical (not legal) review exposes several potential loopholes, however, which could lead to legal challenges. Consideration should be given to closing these loopholes if the opportunity arises.

1.) The statutes authorizing ODFW and ODA to protect the wildlife, agricultural and horticultural interests of the state do not strictly apply to all types of plants and animals. ODFW regulates fish, wild birds, amphibians and reptiles, and wild mammals. ODA regulates insect pests and plant diseases. Both agencies have administrative rules that include additional organisms, i.e. certain aquatic/marine mollusks and crustaceans (ODFW) and phytophagous snails (ODA). From a scientific point of view, this leaves many groups unregulated. A few examples: earthworms, leeches, spiders, mites, centipedes, slugs, squid, starfish, sea urchins, and lampreys. The legislative intent may have been to include all terrestrial invertebrates under "pest insects," and lampreys, starfish and squid under "fish" but the statutory language does not reflect this.

2.) A second loophole has to do with intentional importation of plants and animals that are not considered harmful, and therefore exempt from regulation, at the time of introduction. Some of these organisms escape cultivation or confinement, adapt to Oregon's environment and spread as feral populations. Examples from the past include nutria, bullfrog, English ivy, and Himalayan blackberry. Species available in Oregon today at nurseries, pet stores and over the internet such as butterfly bush, mosquito fish, and Quaker parrots (a.k.a. monk parakeets) are pests in other places. These species and hundreds more like them are unregulated.

ODFW is to be commended for their "approved list" approach toward wildlife introductions. Species are prohibited unless they've been reviewed and approved. In colloquial terms, this approach is known among regulators as the precautionary principle or, "when in doubt, keep it out."

ODA and most other plant regulatory agencies in the country rely on "prohibited lists." Species on these lists are prohibited, all others are allowed. Some regulators refer to this approach as, "not a clue, let it through." The approved list approach is superior for keeping out potentially invasive species. It does restrict trade until sufficient information can be gathered to assess the risks of introducing an exotic organism to a new environment and the reviews can be

time consuming and costly. New Zealand is the world leader in regulating exotic organisms using an "approved list" approach. The "approved list" approach is not popular in today's free-trade commercial environment.

ODA's list of approved insects is advisory only. It has never been adopted in rule and it is unclear whether the department's statutory authority would cover this.

Enforcement is the weakest link in Oregon's invasive species defense. The state relies heavily on voluntary compliance. For example, DEQ has no staff or resources for enforcing the new ballast water law and neither ODA nor ODFW enforces the legal ban on feral swine. Enforcement investigations are typically complaint driven.

In the absence of border stations, thousands of cars and trucks enter the state without being inspected every day. Live plants and animals enter with these vehicles both as intentional passengers and unintentional hitchhikers. Intentional introductions include commercial scale smuggling as well as non-commercial transport by private citizens oblivious to state regulations.

Given the financial resources of the state, enforcement is likely to remain a low priority. Education and efficient, coordinated response programs can partially make up for this deficiency. The lack of a contingency fund to address biological emergencies should also be addressed as soon as possible.

Generic Action Plan for a New Invasion

When a new biological invasion is discovered, whether a clam on the coast or a weed in the wilderness, it should trigger an orderly process to determine whether or not action should be taken to eradicate the population. The basic steps in this process are outlined in the flow chart that follows. Details of the process will vary depending on the type of organism, its distribution, population size, biology, pest status, available mitigation options, etc., but the basic steps should be the same.

1.) The first step is to get the organism identified by an expert. Sometimes, this can be accomplished by taking a sample to a local expert; sometimes it requires sending samples or digital pictures to someone in another state or country.

2.) The second step is to do a preliminary risk assessment. The goal is to quickly determine the level of risk the invasion poses for the state. Information useful for making this determination includes: biology of the organism, its distribution locally and worldwide, its pest status elsewhere, mitigation options, and the window of opportunity for action. If the organism is about to produce a new generation, e.g. a weed in flower, it may be necessary to act without complete information.

3.) If the risk is high, for instance with a known pest species like gypsy moth or kudzu, and mitigation options are available and feasible, then planning for an eradication program should begin immediately. Low risk introductions can be ignored, or dealt with through education or other types of programs. In cases where the level of risk is unknown, a scoping meeting is usually the next step. Bringing together experts, landowners, and stakeholders for a review of what's known may identify possible responses and lead to a plan of action.

4.) If time allows, a formal risk assessment is recommended. Risk assessments review current knowledge about an organism and rate the level of risk for that organism in a new environment. Typically, they include information on the organism's biology, current distribution, potential range, pest status elsewhere, potential for economic and ecological harm, mitigation options, etc. Usually, an overall risk rating is assigned.

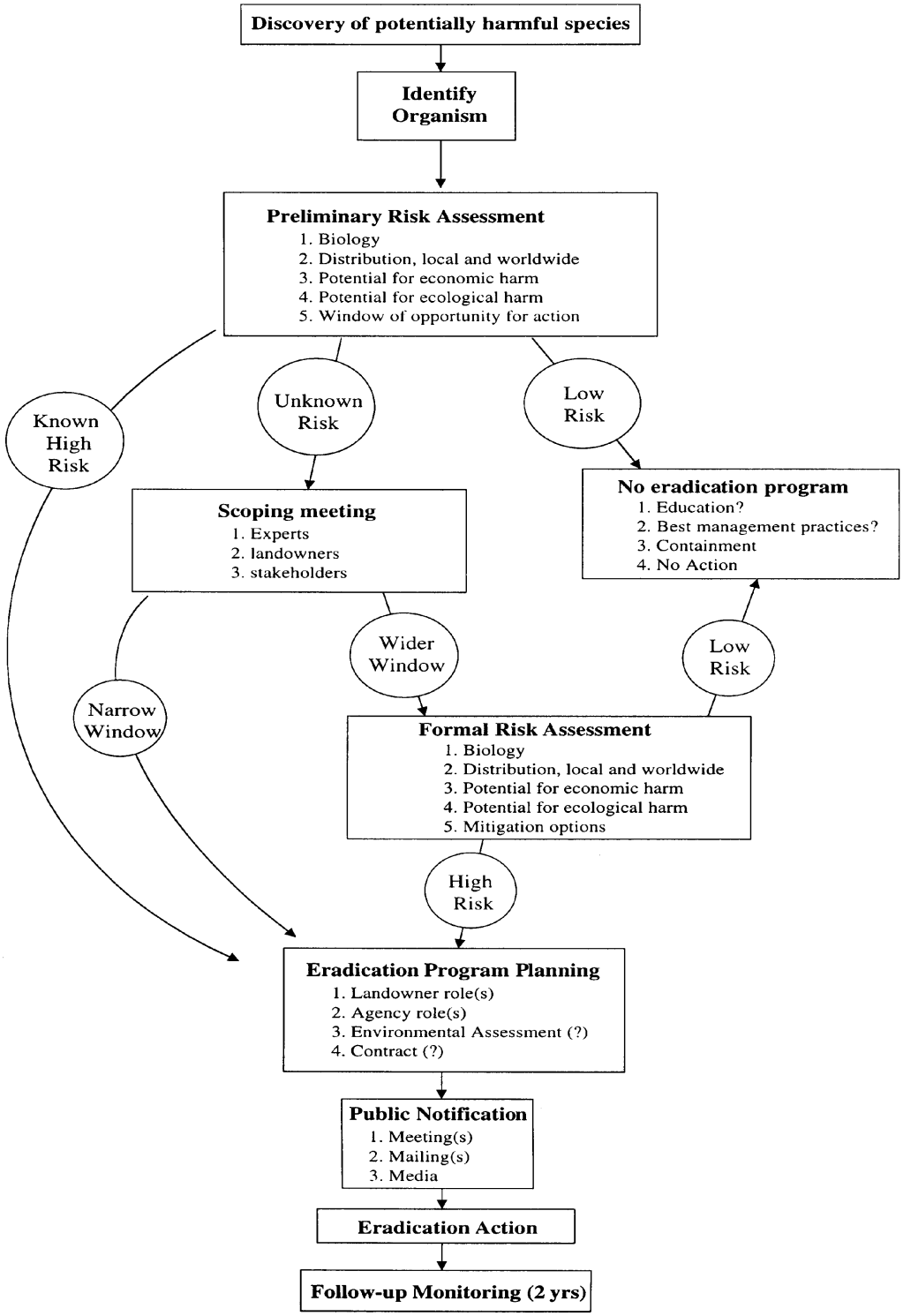
5.) A determination of high risk, combined with available mitigation options, should lead to an eradication program.

6.) Successful eradication programs require close cooperation between agencies, landowners, and other stakeholders. Public meetings, mailings, door-to-door contacts, and media relations play a critical part in ensuring cooperation and success.

7.) After an eradication program, monitoring is necessary to determine if the program was successful. For most organisms, two years (or two generations) of negative survey data is considered the standard for declaring successful eradication.

The Western Regional Panel on Aquatic Nuisance Species has produced a generic rapid response plan for aquatic invasive species. The plan is available at: [www.answest.fws.gov]. A Spartina reponse plan for Oregon was prepared in 2003 and is available online at: [*www.clr.pdx.edu/publications/SpartinaPlan5-8.pdf*].

Flow Chart, Responding to a New Invasion



Conclusion

Oregon's natural, agricultural and horticultural environments are threatened by undesirable, non-native species. Invasive species are a particularly insidious type of pollution -- biological pollution. Once established in new environments, invasive species crowd out native plants and animals in an ever-widening area. It is clear that Oregonians already spend millions of dollars annually on direct control of invasive species and lose even more millions to lost productivity from degraded habitats.

The pace of global trade and travel has increased dramatically in the last few decades. An unintended consequence of this trend has been a rapid rise in the number of undesirable, exotic species that arrive in Oregon as hitchhikers or invited passengers. Only a small fraction of these introductions result in established populations and only a few of these new residents reproduce and spread at a pace that out-competes native plants and animals. Unfortunately, the rate of new introductions has risen so dramatically that Oregon is losing ground in the fight to keep out undesirable invasive species.

Oregon's laws regulating undesirable, exotic species are far ahead of enforcement capabilities and resources for detection and eradication. Ongoing surveillance programs exist for only a few high-risk species. Given these constraints, it is critical that government agencies, industry, environmental groups, and the general public work together to address these issues. Much more education is needed to raise the general level of awareness of invasive species by the public and elected officials. More emphasis needs to be put on risk assessment, exclusion, early detection, and eradication. A systematic process needs to be put in place to address new invasions. Too often, invasions are ignored until economic damage becomes apparent; unfortunately, by then eradication is usually no longer feasible. A key element in any invasive species management effort is coordinated action. The Invasive Species Council should focus on coordinating activities of local, state, federal, and tribal governments and private land managers relating to invasive species in Oregon.

Oregonians have a well-deserved reputation for environmental protection and we treasure our unspoiled natural areas and productive farms and ranches. This action plan is designed to encourage us to recognize the increasing threat posed by invasive species and to work together to protect our priceless environmental heritage.

Literature Cited

Lovell, S.J. and S.F. Stone. 2005. The economic impacts of aquatic invasive species: a review of the literature. U.S. Environmental Protection Agency, National Center for Environmental Economics, Working Paper #05-02,64 pp.

Osterbauer, N. 2003. *Phytophthora ramorum* Pest Risk Assessment for Oregon. Oregon Dept. of Agriculture, Salem, OR. 15 pp.

Pimentel, D., L. Lach, R. Zuniga and D. Morrison. 2000. Environmental and economic costs of nonindigenous species in the United States. BioScience 50:53-56.

Radtke, H. and S.W. Davis. 2000. *Economic Analysis of Containment Programs Damages, and Production Losses From Noxious Weeds in Oregon.* Oregon Department of Agriculture, Salem, OR.

Stewart, D. 2000. Kudzu, Love it -- or Run. Smithsonian. Fall 2000. pp. 65-70.

Thompson. 2001. Re-appraisal of the annual losses in the South caused by red imported fire ant. Poster Presentation, 2001 Ann. Meeting of Nat. Entomol. Soc. Am., San Diego, CA.

U.S. Congress, Office of Technology Assessment. 1993. *Harmful Non-Indigenous Species in the United States*. OTA-F-565 (Washington, DC: U.S. Government Printing Office).

USDA, APHIS. 1998. Managing the Japanese beetle: a homeowner's handbook. Program Aid No. 1599.

USDA, APHIS and Forest Service. 2000. Pest Risk Assessment for Importation of Solid Wood Packing Materials into the United States. August 2000.

U.S.F.S. 1992. Potential Impacts of Asian Gypsy Moth in the Western United States. USDA, Forest Service, Portland, OR. 6 pp.

Westbrooks, R. 1998. Invasive plants, changing the landscape of America: Fact Book. Federal Interagency Committee for the Management of Noxious and Exotic Weeds (FICMNEW), Washington, D.C. 109 pp.

Yamada, S. 2001. Global Invader: The European Green Crab. Oregon Sea Grant, Corvallis, OR. 123 pp.

Chapter 4

Appendix I

General References

Books and Reports

Devine, R. 1998. *Alien Invasion, America's Battle with Non-Native Animals and Plants*. National Geographic Society, Washington DC.

Environmental Law Institute. 2002. *Halting the Invasion: State Tools for Invasive Species Management.* Environmental Law Institute, Washington, DC.

Invasive Plants – Changing the Landscape of America. 1998. Federal Interagency Committee for the Management of Noxious and Exotic Washington, DC.

Low, T. 1999. *Feral Future, The Untold Story of Austrilia's Exotic Invaders*. Viking Penguin, New York, NY.

Mooney, H.A. and R.J. Hobbs, eds. 2000. Invasive Species in a Changing World. Island Press, Washington DC.

National Academy of Sciences. 2002. *Predicting Invasions of Nonindigenous Plant and Plant Pests.* National Academy Press, Washington, DC.

Oregon State of the Environment Report – 2000. Oregon Progress Board. Salem, OR 97301-1283.

Pimentel, D. 2002. *Biological Invasions: Economic and Environmental Costs of Alien Plant, Animal, and Microbe Species*. CRC Press, Boca Raton, FL.

Pulling Together – National Strategy for Invasive Plant Management. 1998. 2nd Ed. U.S. Government Printing Office. Washington, DC.

Radtke, H. and S.W. Davis. 2000. *Economic Analysis of Containment Programs Damages, and Production Losses From Noxious Weeds in Oregon.* Oregon Department of Agriculture, Salem, OR.

U.S. Congress, Office of Technology Assessment. 1993. *Harmful Non-Indigenous Species in the United States*. OTA-F-565 (Washington, DC: U.S. Government Printing Office).

Videos

Alien Invaders. 1998. Cleveland High School and Northwest Film Center. Cambridge Educational (order # CCPO456V-D21). 1-800-468-4227. [www.cambridgeol.com].

Exotic Pests & Diseases, Biology, Economics, Public Policy. 1999. University of California Agricultural Issues Center. Agriculture and Natural Resources. Communication Services.

Invasive Species:Brown Tree Snakes in Guam; Green Invader *Caulerpa taxifolia* the Mediterranean; The Silken Tree Eaters, Asian Longhorned Beetle; Gypsy Moth; Dust Busting, Aspergillus (white plague). Scientific American Frontiers. PBS.org.

You Ought to Tell Somebody, Dealing with Aquatic Invasive Species. Oregon Sea Grant Communications, Oregon State University, Corvallis, OR.

Appendix II

Definitions

"Alien" species means, with respect to a particular ecosystem, any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem (Executive Order 13112. 1999).

A species of flora, fauna or micro-organism, whose natural area of geographic dispersion does not correspond to the national territory and is found in the country, be it a product of voluntary human activity or the activity of the species or not (Costa Rica Article 7.17, Biodiversity Act 1998).

Alien species (non-native, non-indigenous, foreign, exotic) means a species, subspecies, or lower taxon occurring outside of its natural range (past or present) and dispersal potential (i.e. outside the range it occupies naturally or could not occupy without direct or indirect introduction or care by humans) and includes any part, gametes or propagule of such species that might survive and subsequently reproduce (IUCN. 2000).

"Aquatic Nuisance Species" A nonindigenous species that threatens the diversity or abundance of native species or the ecological stability of infested waters, or commercial, agricultural, aquacultural or recreational activities dependent on such waters (NANCPA. 1990).

A nonindigenous species that threatens the diversity or abundance of native species or the ecological stability of infested waters, or commercial, agricultural, aquacultural or recreational activities dependent on such waters. ANS include nonindigenous species that may occur in inland, estuarine and marine waters and that presently or potentially threaten ecological processes and natural resources. In addition to adversely affecting activities dependant on waters of the United States, ANS adversely affect individuals, including health effects (ANSTF. 1994).

A plant or animal species that threatens the diversity or abundance of native species, the ecological stability of infested waters, or commercial, agricultural, aquacultural, or recreational activities dependent on such waters. (Note: for the purposes of the State management plans, reference to an aquatic nuisance species will imply that the species is non-indigenous.) (ORANSMP 2001).

Any species or other viable biological material that enters an ecosystem beyond its historic range (OR SB 895).

"Control" means, as appropriate, eradicating, suppressing, reducing, or managing invasive species populations, preventing spread of invasive species from areas where they are present, and taking steps such as restoration of native species and habitats to reduce the effects of invasive species and to prevent further invasions (Executive Order 13112. 1999).

Control: Activities to eliminate or reduce the effects of ANS, including efforts to eradicate infestations, reduce ANS populations, develop means to adapt human activities and facilities to accommodate infestations, and prevent the spread of ANS from infested areas. Control may involve activities to protect native species likely to be adversely affected by ANS (ANSTF. 1994).

Control: limiting the distribution and abundance of a species (ORANSMP 2001).

"Cryptogenic" species: A species that may or may not be indigenous to an area.

"Ecosystem" means the complex of a community of organisms and its environment (Executive Order 13112. 1999).

Ecosystem: the biological organisms in an ecological community and the non–living factors of the environment (ORANSMP 2001).

"Eradicate": the act or process of eliminating an aquatic nuisance species. Pioneer infestation: A small ANS colony that has spread to a new area from an established colony (ORANSMP 2001).

"Established" The condition of a species that has formed a self-sustaining, free-living population at a given location (OTA 1993).

An introduced organism with a permanent population(s) i.e. one unlikely to be eliminated by man or natural causes (Shafland, Paul L., and Lewis, William M. 1984).

We define established organisms as those organisms present and reproducing "in the wild" whose numbers, distribution and persistence over time suggest that, barring unforeseen catastrophic events or successful eradication efforts, they will continue to be present in the future. "In the wild" implies reproduction and persistence of the population without direct human intervention or assistance (such as reproductive assistance via hatcheries or periodic renewal of the population through the importation of spat), but may include dependence on human-altered or created habitats, such as water bodies warmed by the cooling-water effluent from power plants, pilings, floating docks, and salt ponds or other manipulated, semi-enclosed lagoons. The types of evidence that we used to assess establishment include:

· population size;
· persistence of the population over time;
· distribution (broad or restricted) of the population, and trends in distribution;
· for species dependent on sexual reproduction, the presence of both males and females, and the presence of ovigerous females; and
· the age structure of the population as an indicator of successful reproduction (Cohen, Andrew N. and Carlton, James T. 1995).

"Exotic" All species of plants and animals not naturally occurring, either presently or historically, in any ecosystem of the United States (Executive Order 11987. 1977).

Nonindigenous species that are not native to the continental United States. In Hawaii and the insular territories and possessions of the United States, exotics are nonindigenous species that are not native to each area. (ANSTF 1994).

Exotic: (same as non-indigenous) any species or other variable biological material that enters an ecosystem beyond its historic range, including such organisms transferred from one country to another (ORANSMP 2001).

Exotic means a wildlife species not native to Oregon; foreign or introduced (OAR 635-056-0010).

An organism introduced from a foreign country (i.e. one whose entire native range is outside the country where found) (Shafland, Paul L., and Lewis, William M. 1984).

"Foreign" [fish] means fish which originate through human intervention from a different population (OAR 635-007-0501).

"Indigenous" The condition of a species being within its natural range or natural zone of potential dispersal; excludes species descended from domesticated ancestors (OTA 1993).

Indigenous means descended from a population that is believed to have been present in the same geographical area prior to the year 1800 or that resulted from a natural colonization from another indigenous population (ORS 635-007-0501).

"Injurious" wildlife as several named species ''and other species of wild mammals, wild birds, fish (including mollusks and crustacean), amphibians, reptiles, or the offspring or eggs of any of the foregoing which the Secretary of the Interior may prescribe by regulation to be injurious to human beings, to the interests of agriculture, horticulture, forestry, or to wildlife or the wildlife resources of the United States. "(Lacey Act 1900).

"Introduced" species: (= nonindigenous species, = exotic species) Any species intentionally or accidentally transported and released by humans into an environment outside its present range (ICES 1994).

A species, subspecies or population which occur in Oregon because of human action or intervention, rather than natural (nonhuman) colonization or immigration (OAR 635-056-0010).

A plant or animal moved from one place to another by man (i.e., an individual, group, or population of organisms that occur in a particular locale due to man's actions) (Shafland, Paul L., and Lewis, William M. 1984).

Introduced organism is defined to include any organism that has become part of Hungary's flora or fauna due to man's intentional or unintentional introduction (Nature Conservation Act of Hungary 1996).

"Introduction" All or part of the process by which a non-indigenous species is imported to a new locale and is released or escapes into a free-living state (OTA 1993).

Unintentional introduction means an introduction of nonindigenous species that occurs as the result of activities other than the purposeful or intentional introduction of the species involved, such as the transport of nonindigenous species in ballast or in water used to transport fish, mollusks or crustaceans for aquaculture or other purposes (NANCPA 1990).

The release, escape, or establishment of an exotic species into a natural ecosystem (Executive Order 11987. 1977).

The intentional or unintentional escape, release, dissemination, or placement of a species into an ecosystem as a result of human activity (Executive Order 13112. 1999).

Intentional Introductions: The import or introduction of nonindigenous species into, or transport through, an area or ecosystem where it is not established in open waters for a specific purpose such as fishery management. Even when the purpose of such import or transport is not direct introduction into an open ecosystem (e.g., for aquaculture or display in an aquarium), introduction into open waters as the result of escapement, accidental release, improper disposal (e.g., "aquarium dumping"), or similar releases is a virtually inevitable consequence of the intentional introduction, not an unintentional introduction (ANSTF 1994).

Accidental introduction: an introduction of non-indigenous aquatic species that occurs as the result of activities other than the purposeful or intentional introduction of the species involved, such as the transport of non-indigenous species in ballast water or in water used to transport fish, mollusks, or crustaceans for aquaculture or other purposes (ORANSMP 2001).

Intentional introduction: all or part of the process by which a non-indigenous species is purposefully introduced into a new area (ORANSMP 2001).

Introduction means, in scientific terms, that the alien species, subspecies or lower taxon has been transported by humans across a major geographic barrier (such introductions within a country are also referred to as translocations). From a legal point of view, this term obviously requires further definition (Clare Shine, Nattley Williams and Lothar Gündling 2000).

The movement, by human agency, of a species, subspecies, or lower taxon (including any part, gamete or propagule that might survive and subsequently reproduce) outside its natural range (past or present). This movement can be either within a country or between countries (IUCN, 2000).

"Invasive Species" An alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health (Executive Order 13112 1999).

Alien invasive species: an alien species which threatens ecosystems, habitats or species. Alien invasive species are agreed to be a subset of alien species as a whole, as many introduced alien species do not go on to become invasive. However, there is uncertainty and much debate about the point (Clare Shine, Nattley Williams and Lothar Gündling 2000).

Alien invasive species means an alien species which becomes established in natural or semi-natural ecosystems or habitat, is an agent of change, and threatens native biological diversity (IUCN, 2000).

Invasive species means nonnative organisms that cause economic or environmental harm and are capable of spreading to new areas of the state. Invasive species does not include humans, domestic livestock or nonharmful exotic organisms (ORS 561.685).

"Native" All species of plants and animals naturally occurring, either presently or historically, in any ecosystem of the United States (Executive Order 11987. 1977).

With respect to a particular ecosystem, a species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem (Executive Order 13112. 1999).

Any indigenous or resident species currently or historically found in this state (OAR 603-073-0002).

Species, subspecies or populations which occur currently or historically in Oregon through natural (i.e. nonhuman) colonization or immigration, rather than by human action or intervention (OAR 635-056-0010).

Those organisms present aboriginally, which for the Bay-Delta region means prior to 1769 when the first European explorers entered the area. The types of evidence that we utilized to determine the native versus introduced status of aquatic and estuarine organisms, as discussed by Carlton (1979a) and Chapman & Carlton (1991, 1994), include:
· global systematic evidence (involving taxonomic information from both morphology and molecular genetics) and biogeographic evidence, including the global distribution of closely related species;
· the existence of identifiable mechanisms of human-mediated transport;
· historical evidence of presence or absence;
· archaeological evidence of presence or absence;
· paleontological evidence of presence or absence;
· the extent to which distribution can be explained by natural dispersal mechanisms;
· rapid or sudden changes in abundance or distribution;

· highly restricted or anomalously disjunct distributions (in comparison to distributions of known native organisms);
· occurrence in assemblages with other known introduced species; and
· for parasites or commensals, occurrence on introduced organisms. (Cohen, Andrew N. and Carlton, James T. 1995).

"Nonindigenous" The condition of a species being beyond its natural range or natural zone of potential dispersal; includes all domesticated and feral species and all hybrids except for naturally occurring crosses between indigenous species (OTA 1993).

Any species or other viable biological material that enters an ecosystem beyond its historic range, including any such organism transferred from one country into another (NANCPA 1990).

Any species or other viable biological material that enters an ecosystem beyond its historic range, including any such organism transferred from one country into another. Nonindigenous species include both exotics and transplants (ANSTF 1994).

Any species or other variable biological material that enters an ecosystem beyond its historic range, including such organisms transferred from one country to another (ORANSMP 2001).

Nonnative means a wildlife species not native to Oregon; foreign or introduced (OAR 635-056-0010).

"Noxious" weeds: any living stage (including but not limited to, seeds and reproductive parts) of any parasitic or other plant of a kind, or subdivision of a kind, which is of foreign origin is new to or not widely prevalent in the United States, and can directly or indirectly injure crops, other useful plants, livestock or poultry or other interests of agriculture, including irrigation or navigation or the fish or wildlife resources of the United States or the public health (FNWA 1974).

Noxious weed: any plant or plant product that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health, or the environment (Plant Protection Act. 2000).

"Noxious Weed" means any plant designated by the Oregon State Weed Board that is injurious to public health, agriculture, recreation, wildlife, or any public or private property (ODA 2002).

"Natural range" -The geographic area a species inhabits or would inhabit in the absence of significant human influence (OTA 1993).

"Natural zone of potential dispersal" -The area a species would disperse to in the absence of significant human influence (OTA 1993).

"Plant pest" --The term ``plant pest'' means any living stage of any of the following that can directly or indirectly injure, cause damage to, or cause disease in any plant or plant product:
(A) A protozoan.
(B) A nonhuman animal.
(C) A parasitic plant.
(D) A bacterium.
(E) A fungus.
(F) A virus or viroid.
(G) An infectious agent or other pathogen.

(H) Any article similar to or allied with any of the articles specified in the preceding subparagraphs (Plant Protection Act 2000).

"Transplanted:" an organism moved outside its native range but within a country where it occurs naturally (i.e. one whose native range includes at least a portion of the country where found) (Shafland, Paul L., and Lewis, William M. 1984).

"Species:" A group of organisms all of which have a high degree of physical and genetic similarity, generally interbreed only among themselves, and show persistent differences from members of allied groups of organisms (Executive Order 13112. 1999).

"Weed:" any plant which grows where not wanted (FIFRA 1947).

"Wild fish" means any naturally spawned fish in the taxonomic classes, Agnatha, Chondrichthyes, and Osteichthyes, belonging to an indigenous population (OAR 635-007-0501).

References for Definitions

Aquatic Nuisance Species Task Force (ANSTF). 1994.Aquatic Nuisance Species Program. Washington, D.C.

Clare Shine, Nattley Williams and Lothar Gündling (2000), A Guide to Designing Legal and Institutional Frameworks on Alien Invasive Species. IUCN, Gland, Switzerland Cambridge and Bonn.

Cohen, Andrew N. and Carlton, James T. 1995 Nonindigenous Aquatic Species in a United States estuary: A case study of the Biological Invasions of the San Francisco Bay and Delta. United States Fish and Wildlife Service. Washington D. C.

Costa Rica Article 7.17, Biodiversity Act 1998.

Executive Order 11987. 1977. Exotic organisms FR 26949.

Executive Order 13112. 1999. Invasive Species. Federal Register Document. 99-3184.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) 1947.

Federal Noxious Weed Act (FNWA). 1974. as amended (7 U. S.C.A. 2801-2814).

International Council for the Exploration of the Sea (ICES). 1994. ICES Code of Practice on the Introductions and Transfers of Marine Organisms.

The International Union for Conservation of Nature and Natural Resources (IUCN). 2000. IUCN Guidelines for the Prevention of Biodiversity loss due to Biological Invasion (approved by the IUCN Council, February, 2000).

Nature Conservation Act of Hungary 1996.

Nonindigenous Aquatic Nuisance Prevention and Control Act (NANCPA). 1990. (P.L. 101-646, 11/29/90, as amended through 10/26/96).

Office of Technology Assessment (OTA). 1993. Harmful Non-indigenous Species in the United States. U.S. Congress, OTA-F-565, 1993. US Government Printing Office, Washington DC.

Oregon Administrative Rule (OAR) 603-073-0002. Department of Agriculture Division 73: Plants: Wildflowers and Endangered, Threatened, and Candidate Species.

Oregon Administrative Rules (OAR) 635-007-0501. Department of Fish and Wildlife Division 7: Fish Management and Hatchery Operation.

Oregon Administrative Rules (OAR) 635-056-0010. Department of Fish and Wildlife Division 56: Importation, Possession, Confinement, Transportation and Sale of Nonnative Wildlife.

Oregon Aquatic Nuisance Species Management Plan (ORANSMP). 2001. Center for Lakes and Reservoirs. Portland State University. Portland, OR.

Oregon Department of Agriculture (ODA) 2002. Noxious Weed Policy and Classification System.

Oregon Senate Bill 895 (OR SB 895) 2001. An Act Relating to Ballast Water.

Oregon Revised Statutes (ORS 561.685). Invasive Species Council.

Plant Protection Act (PPA). 2000.

Appendix III

Invasive Species Established in Oregon in 2000

10/24/2002 — Established Invasive Species — Oregon

Species Name	Common Name
Amphibian	
Rana catesbeiana	Bullfrog
Arachnid	
Aculus fockeui	Plum rust mite
Bryobia praetiosa	Clover mite
Panonychus ulmi	European red mite
Phytocoptella avellanae	Filbert bud mite
Phytonemus pallidus	Cyclamen mite
Phytoptus pyri	Pearleaf blister mite
Rhizoglyphus echinopus	Bulb mite
Schizotetranychus celarius	Bamboo spider mite
Tegenaria agestis	Hobo spider
Tegenaria gigantea	Giant house spider
Bacterial Pathogen	
Acidovorax avenae subsp. citrulli.	Watermelon fruit blotch
Rathayibacter rathayi	Yellow berry of orchard grass
Erwinia amylovora	Fire blight
Bird	
Sturnus vulgaris	European starling
Columba livia	Pigeon, Rock Dove
Alopochen aegyptiacus	Egyptian goose
Myiopsitta monachus	Monk parakeet
Passer domesticus	House sparrow
Cygnus olor	Mute swan
Crustacean	
Carcinus maenas	European green crab
(All Cambaridae family)	Crayfish
Fish	
Archoplites interruptus	Sacramento perch
Misgurnus anguillicaudatus	Oriental weatherfish
Ctenopharyngodon idella	Grass carp
Cyprinus carpio	Common carp
Notemigonus crysoleucas	Golden shiner
Pimephales promelas	Fathead minnow
Tinca tinca	Tench
Fundulus diaphanus	Banded killifish
Lucania parva	Rainwater killifish
Noturus gyrinus	Tadpole madtom
Pylodictis olivaris	Flathead catfish
Gambusia affinis	Mosquitofish
Fungal Pathogen	
Rhizoctonia spp.	Rhizoctonia web blight
Pyrenophora graminea	Barley stripe rust
Phytophthora infestans	Potato/tomato late blight, mating type a2
Melampsora larici-populina	Melampsora rust of poplar
Phytophthora lateralis	Port Orford Cedar root disease
Cronartium ribicola	White pine blister rust
Melampsora medusae f. sp. deltoidae	Melampsora leaf rust
Sphaerotheca macularis	Hop powdery mildew
Anisogramma anomala	Eastern filbert blight
Ophiostoma ulmi, O. novo-ulmi	Dutch elm disease
Tilletia walkerii	Rygrass smut
Tilletia controversa	Wheat dwarf bunt
Puccinia striiformis	Wheat stripe rust
Puccinia striiformis f. sp. hordei	Barley stripe rust
Ovulinia azaleae	Azalea petal blight

1

Species Name	Common Name
Peronospora sparsa	Downy mildew of rose
Discula destructiva	Dogwood anthracnose
Insect	
Yponomeuta malinella	Apple ermine moth
Hylastes opacus	Bark beetle
Monarthrum fasciatum	Bark beetle
Linepithema humile	Argentine ant
Tipula oleracea	Large common crane fly
Oulema melanopus	Cereal leaf beetle
Daktulosphaira vitifoliae	Grape phylloxera
Harmonia axyridis	Multicolored Asian ladybug
Tipula paludosa	European cranefly
Acanthoscelides obtectus	Bean weevil
Acyrthosiphon kondoi	Blue alfalfa aphid
Acyrthosiphon pisum	Pea aphid
Adelges piceae	Balsam woolly aphid
Agrilus cuprescens	Rose stem girdler
Anagasta kuehniella	Mediterranean flour moth
Anarsia lineatella	Peach twig borer
Anthrenus scrophulariae	Carpet beetle
Aphis craccivora	Cowpea aphid
Archips rosanus	Filbert leafroller
Asterolecanium minus	an oak pit scale
Asterolecanium quercicola	Oak pit scale
Attagenus unicolor	Black carpet beetle
Blatella germanica	German cockroach
Blatta orientalis	Oriental cockroach
Bruchus brachialis	Vetch bruchid
Bruchus pisorum	Pea weevil
Bruchus rufimanus	Broadbean weevil
Cacopsylla pyricola	Pear psylla
Caliroa cerasi	Pear sawfly
Caloptilia azaleella	Azalea leafminer
Caloptilia syringella	Lilac leafminer
Carulaspis juniperi	Juniper Scale
Chloropulvinaria floccifera	Cottony camellia scale
Choreutis pariana	Apple-and-thorn skeletonizer
Chromatomyia syngenesiae	Chrysanthemum leafminer
Coleophora laricella	Larch casebearer
Crioceris asparagi	Asparagus beetle
Crioceris duodecimpunctata	Spotted asparagus beetle
Cryptorhynchus lapathi	Poplar-and-willow borer
Cydia pomonella	Codling moth
Dasineura pyri	Pear leaf midge
Delia antiqua	Onion maggot
Delia platura	Seedcorn maggot
Delia radicum	Cabbage maggot
Dialeurodes chittendeni	Rhododendron whitefly
Dichomeris marginella	Juniper webworm
Diuraphis noxia	Russian wheat aphid
Ewardsiana rosae	Rose leafhopper
Endelomyia aethiops	Rose slug
Epitrix tuberus	Tuber flea beetle
Eriosoma lanigerum	Woolly apple aphid
Eriosoma ulmi	Currant root aphid
Euceraphis betulae	Silver birch aphid
Eumerus tuberculatus	Lesser bulb fly
Fenusa pusilla	Birch leafminer
Forficula auricularia	European earwig

Species Name	Common Name
Galerucella numphaeae	Waterlily leaf beetle
Galleria mellonella	Greater wax moth
Gasterophilus intestinalis	Horse bot fly
Gossyparia spuria	European elm scale
Grapholita molesta	Oriental fruit moth
Grapholita prunivora	Lesser appleworm
Haematobia irritans	Horn fly
Hylastinus obscurus	Clover root borer
Hypera nigrirostris	Lesser clover leaf weevil
Hypera postica	Alfalfa weevil
Hypera punctata	Clover leaf weevil
Lepidosaphes ulmi	Oystershell scale
Leptinotarsa decemlineata	Colorado potato beetle
Leucoma salicis	Satin moth
Loxostege sticticalis	Beet webworm
Lyctus brunneus	Old World lyctus beetle
Macrosiphonella sanborni	Chrysanthemum aphid
Mayetiola destructor	Hessian fly
Merodon equestris	Narcissus bulb fly
Monarthropalpus flavus	Boxwood leafminer
Monomorium pharaonis	Pharaoh ant
Musca autumnalis	Face fly
Myzocallis coryli	Filbert aphid
Myzus cerasi	Black cherry aphid
Myzus persicae	Green peach aphid
Nematus ribesii	Imported currantworm
Operophtera brumata	Winter moth
Oryizaephilus surinamensis	Sawtoothed grain beetle
Otiorhynchus meridionalis	Lilac weevil
Otiorhynchus ovatus	Strawberry root weevil
Otiorhynchus raucus	a root weevil
Otiorhynchus rugosostriatus	Rough strawberry root weevil
Otiorhynchus singularis	Claycolored weevil
Otiorhynchus sulcatus	Black vine weevil
Paravespula germanica	German yellowjacket
Parthenolecanium corni	European fruit lecanium
Pegomya hyoscyami	Spinach leafminer
Periphyllus testudinacea	European maple aphid
Periplaneta americana	American cockroach
Philaenus spumarius	Meadow spittlebug
Physokermes piceae	Spruce bud scale
Phytomyza ilicis	Holly leafminer
Pieris rapae	Imported cabbageworm
Plodia interpunctella	Indianmeal moth
Plutella xylostella	Diamondback moth
Xanthogaleruca luteola	Elm leaf beetle
Quadraspidiotus perniciosus	San Jose scale
Rhagoletis completa	Walnut husk fly
Rhagoletis pomonella	Apple maggot
Rhopobota naevana	Blackheaded fireworm
Rhyacionia buoliana	European pine shoot moth
Schizaphis graminum	Greenbug
Scolytus multistriatus	Smaller European elm bark beetle
Scolytus rugulosus	Shothole borer
Sitona hispidulus	Clover root curculio
Sitona lineatus	Pea leaf weevil
Sitophilus granarius	Granary weevil
Sitophilus oryzae	Rice weevil
Spilonota ocellana	Eyespotted bud moth

Species Name	Common Name
Spodoptera exigua	Beet armyworm
Supella longipalpa	Brownbanded cockroach
Synanthedon tipuliformis	Currant borer
Taeniothrips inconsequens	Pear thrips
Takecallis arundicolens	Bamboo aphid
Tenebrio molitor	Yellow mealworm
Tetramorium caespitum	Pavement ant
Therioaphis maculata	Spotted alfalfa aphid
Thrips simplex	Gladiolus thrips
Trialeurodes vaporariarum	Greenhouse whitefly
Triboloum confusum	Confused flour beetle
Tychius picirostris	Clover seed weevil
Udea rubigalis	Celery leaftier
Lasioderma serricorne	Cigarette beetle
Stegobium paniceum	Drugstore beetle
Ryzopertha dominica	Lesser grain borer
Amblycerus robiniae	Locust seed beetle
Megacyllene robiniae	Locust borer
Neoclytus acuminatus acuminatus	Redheaded ash borer
Longitarsus ganglbaueri	a flea beetle
Phyllotreta cruciferae	Cabbage flea beetle
Necrobia ruficollis	Red-shouldered ham beetle
Necrobia rufipes	Red-legged ham beetle
Necrobia violacea	Purple ham beetle
Ahasverus advena	Foreign grain beetle
Oryzaephilus mercator	Merchant grain beetle
Ceutorhynchus erysimi	a curculio
Ceutorhynchus rapae	Cabbage curculio
Sitona cylindricollis	Sweetclover weevil
Sitona lineellus	Lesser alfalfa weevil
Sitophilus zeamais	Maize weevil
Trachyphloeus asperatus	a weevil
Trachyphloeus bifoveolatus	Grass weevil
Anthrenus verbasci	Varied carpet beetle
Dermestes ater	Black larder beetle
Dermestes lardarius	Larder beetle
Dermestes maculatus	Hide beetle
Lyctus cavicollis	Western powderpost beetle
Lyctus linearis	European powderpost beetle
Lyctus planicollis	Southern powderpost beetle
Typhaea stercorea	Hairy fungus beetle
Carpophilus hemipterus	Dried fruit beetle
Carpophilus marginellus	Shiny sap beetle
Nacerdes melanura	Wharf borer
Mezium affine	Shiny spider beetle
Alphitobius diaperinus	Lesser mealworm
Cynaeus angustus	Large black flour beetle
Tenebriodes mauritanicus	Cadelle beetle
Tenebrio obscurus	Dark meal worm
Tribolium castaneum	Red flour beetle
Ceutorhynchus assimilis	Seedpod weevil
Mammal	
Ovis musimon	Mouflon sheep
Myocastor coypus	Nutria
Sciurus carolinensis	Eastern gray squirrel
Sciurus niger	Eastern fox squirrel
Sylvilagus floridanus	Eastern cottontail rabbit
Rattus norvegicus	Rat
Rattus rattus	Black Rat

Species Name	Common Name
Didelphis virginiana	Virginia opossum
Mus musculus	House mouse
Vulpes vulpes	Eastern red fox
Sus scrofa (not domestica)	European wild boar
Mollusk	
Potamopyrgus antipodarum	New Zealand mudsnail
Deroceras reticulatum	Gray gardenslug
Helix aspersa	Brown Gardensnail
Limax maximus	Giant gardenslug
Limax pseudoflavus	Gray-green gardenslug
Milax gagates	Greenhouse slug
Nematode	
Anguina agrostis	Seed nematode
Other Invertebrate	
Pseudodiaptomus inopinus	Asian calanoid copepod
Corbicula fluminea	Asian estuary clam
Ceratostoma inornatum	Japanese oyster drill
Plant	
Peganum harmala	African Rue
Centaurea macrocephala	Big-headed knapweed
Centaurea iberica	Iberian starthistle
Pueraria lobata	Kudzu
Nardus stricta	Matgrass
Hieracium aurantiacum	Orange hawkweed
Carduus acanthoides	Plumeless thistle
Centaurea calcitrapa	Purple starthistle
Orobanche minor	Small broomrape
Spartina alterniflora	Smooth cordgrass
Carthamus baeticus	Smooth distaff thistle
Centaurea virgata	Squarrose knapweed
Carthamus lanatus	Woolly distaff thistle
Hieracium floribundum	Yellow hawkweed
Sphaerophysa salsula	Austrian peaweed
Crupina vulgaris	Bearded creeper
Acaena novae-zelandiae	Biddy-biddy
Solanum rostratum	Buffaloburr
Cirsium vulgare	Bull thistle
Cirsium arvense	Canada thistle
Rorippa sylvestris	Creeping yellow cress
Linaria dalmatica	Dalmation toadflax
Centaurea diffusa	Diffuse knapweed
Cuscuta spp.	Dodder
Isatis tinctoria	Dyers woad
Myriophyllum spicatum	Eurasian watermilfoil
Convolvulus arvensis	Field bindweed
Cytisus monspessulanas	French broom
Equisetum telmateia	Giant horsetail
Polygonum sachalinense	Giant knotweed
Ulex europaeus	Gorse
Cardaria pubescens	Hairy whitetop
Halogeton glomeratus	Halogeton
Rubus discolor	Himalayan blackberry
Polygonum polystachyum	Himalayan knotweed
Cynoglossum officinale	Houndstongue
Carduus pycnocephalus	Italian thistle
Polygonum cuspidatum	Japanese knotweed
Sorghum halepense	Johnsongrass

Species Name	Common Name
Aegilops cylindrica	Jointed goatgrass
Kochia scoparia	Kochia
Euphorbia esula	Leafy spurge
Cardaria chalapensis	Lens-podded whitetop
Centaurea pratensis	Meadow knapweed
Salvia aethiopis	Mediterranean sage
Taeniatherum caput-madusae	Medusahead rye
Carduus nutans	Nodding thistle
Lepidium latifolium	Perennial pepperweed
Conium maculatum	Poison hemlock
Cytisus striatus	Portugese broom
Tribulus terrestris	Puncturevine
Lythrum salicaria	Purple loosestrife
Agropyron repens	Quackgrass
Ambrosia artemisiifolia	Ragweed
Chondrilla juncea	Rush skeletonweed
Centaurea repens	Russian knapweed
Cytisus scoparius	Scot's broom
Onopordum acanthium	Scotch thistle
Carduus tenuiflorus	Slender-flowered thistle
Elodea densa	South American waterweed
Spartium junceum	Spanish broom
Hemizonia pungens	Spikeweed
Xanthium spinosum	Spiny cocklebur
Centaurea maculosa	Spotted knapweed
Hypericum perforatum	Klamath weed
Potentilla recta	Sulfur cinquefoil
Tamarix ramosissima	Tamarix
Senecio jacobeae	Tansy ragwort
Abutilon theophrasti	Velvetleaf
Cardaria draba	White top
Panicum miliaceum	Wild proso millet
Cyperus esculentus	Yellow nutsedge
Centaurea solstitialis	Yellow starthistle
Linaria vulgaris	Yellow toadflax
Brachypodium sylvaticum	False-brome
Digitalis purpurea	Foxglove
Genista monspessulana	Broom
Geranium lucidum	Shining crane's bill
Geranium robertianum	Herb Robert
Hedera helix	English ivy
Ilex aquifolium	English holly
Iris pseudacorus	Yellow flag iris
Ranunculus repens	Creeping buttercup
Nasturtium officinale	Water-cress
Cabomba caroliniana	Carolina fanwort
Callitriche stagnalis	Pond water-starwort
Myriophyllum aquaticum	parrot-feather
Potamogeton crispus	Curly pondweed
Zostera japonica	Dwarf eelgrass
Sagittaria sagittifolia	Arrowhead
Rubus fruticosus	Wild blackberry complex
Leucanthemum vulgare	Ox-eye daisy
Rubus vestitus	European blackberry
Salsola iberica	Russian thistle
Bromus tectorum	Cheatgrass
Reptile	
Chelydra serpentina	Snapping turtle
Trachemys scripta elegans	Red-eared slider

Species Name	Common Name
Cnemidophorus zelox	Plateau striped whiptail
Chrysemys picta	Non-native painted turtle
Virus	
	Blueberry scorch virus
	Blueberry shock virus
	Wheat soilborne mosaic Virus
	Beet necrotic yellow vein virus

Appendix IV

Contacts

Invasive Species Reporting Hotline: 1-866-INVADER
Website: egov.oregon.gov/OISC

Current Oregon Invasive Species Council Members

	Term Expires
Suzanne Cudd Whiskey Creek Shellfish Hatchery 2975 Netarts Bay Road W. Tillamook, OR 97141 (503) 815-8323 FAX: (503) 842-6426 suecudd@aol.com	December 31, 2005
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Risa Demasi Grassland Oregon P.O. Box 21630 Keizer, OR 97307 (503) 566-9900 FAX: (503) 566-9901 risarue@aol.com	December 31, 2005
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Former Council Members

Shaun Monahan, Waves Marine Aquaria, 2002
Paul Lagner, Port of St. Helens, 2002
Bill Cook, Port of Astoria, 2003
Steve Buttrick, The Nature Conservancy, 2002-2003
Blaine Parker, Columbia River Inter-Tribal Fish Commission, 2002-2004
Keith Warren, J. Frank Schmidt & Son Co., 2002-2004
Paul Heimowitz, U.S. Fish & Wildlife, 2002-2004
Richard Mishaga, Port of Portland, 2003-2004