Key Pest Issues That Form the Focus for agency IPM programs

	VEGETATION	INSECTS	INVASIVE SPECIES	NUISANCE SPECIES	RESEARCH & MONITORING
ODFW (Fish)	-	-	-	Predation on hatchery fish/removal of non-natives	-
ODFW (Wildlife)	Weeds damage to native plants and crops for wildlife	Pests that spread disease (mosquitoes – West Nile Virus)	Species that compete with native wildlife (feral swine)	Furbearers that burrow into dikes/water control structures	-
ODF (State and Private Forests)	Restoration	Control pests	Control pathogens	Managing damaging species	Cooperative applied research
DAS	85% on weed control in beds and lawns; 0.5% on landscape plants	0.5% on landscape insects	-	10% on rodents; 4% miscellaneous building pests	-
OPRD	-	Vector management (mosquitoes) - limited	Invasive plants	Animals that conflict with parks (bears, etc.)	-
DSL (Common School Fund)	Controlling noxious weeds	Controlling forest pests	Controlling marine organisms in estuaries	Controlling marine organisms in estuaries	Research on marine invasions
DEQ	-	-	-	Pest issues in leased buildings (occasionally)	-
ODA	Noxious weeds	Insect pests to agriculture, etc.	Invasive weeds and insects	-	Monitoring and certification
DOC		Controlling pests in corrections facilities	-	-	-
ODOT	Highway Vegetation Safety	-	-	-	-

State Statutes That Guide IPM

	State Statutes
ODFW (Fish)	496.012, 496.138, 496.171, 496.176, 496.182, 496.430, 496.435, 496.445, 496.450, 496.455
ODFW (Wildlife)	496.012, 496.138, 496.146, 497.298, 497.312, 497.318, 498.022, 498.029, 498.052, 498.222, 498.242, 497.308, 498.022, HB 2221, 498.002, HB 2220, HB 2583
ODF (State and Private Forests)	527.310 to 527.370, 634.650 to 634.655
DAS	Senate bill 262
OPRD	643.660, 603-057-0405, 569.350
DSL (Common School Fund)	634.650 to 634.665, 273.815, 527.310 to 527.370
DEQ	468B.050
ODA	634.650 to 634.665, 569.175 to 569.990, 579, 561.510 to 561.560
DOC	569.175 to 569.195, 634.005 to 634.992
ODOT	634.650 to 634.665

Model Used to Implement IPM

	Model
ODFW (Fish)	Identification, Prevention, and Control
ODFW (Wildlife)	Identification, Prevention, and Control
ODF (State and Private Forests)	IPM is a foundational element of the practice of forestry
DAS	Control of pests (weeds, insects, animals, and fungi) within acceptable thresholds of tolerance for the given pest.
OPRD	OPRD IPM Program based on ODA model
DSL (Common School Fund)	Rangelands – Ecologically-based IPM – based on understanding the management issues that cause weeds to be present. Forestlands, Submerged and Submersible Lands – Generally best practices for IPM, consistent with 527.310 to 527.370.
DEQ	An extension of the Pesticide Stewardship Program is a partnership with OSU Integrated Plant Protection Center for intensive watershed-based IPM in Yamhill and Pudding watersheds.
ODA	Exclusion/prevention and EDRR (survey, detection, eradication, & monitoring).
DOC	Standard health requirements and policies that dictate inmate rules of confinement
ODOT	ODOT Integrated Vegetation Management (IVM) model based on ORS 634.650* • Reasons for managing vegetation: Safety, Protecting road prism structure, Stewardship, and Legal Compliance

* IPM is defined as a coordinated decision-making and action process that uses the most appropriate pest control methods and strategy in an environmentally and economically sound manner to meet agency management objectives.

	Guiding Principles
ODFW (Fish)	Whether or not to treat a water body with rotenone to remove unwanted fish species is determined on a case-by-case basis depending on ownership, limnology, history, species, cost, and potential for fishery or ecological benefit
ODFW (Wildlife)	• -
ODF (State and Private Forests)	• *Forestry Program for Oregon* – guiding policy document; Monitor and act to prevent and mitigate the effects of invasive, non-native species while protecting, maintaining, and enhancing the health of Oregon's forest ecosystems, watersheds, and airsheds. • Private forests – Encourage voluntary use of IPM in alignment with landowner objectives, require forest landowners to implement pest prevention and suppression, surveys conducted by state to assess extent, trends, and impacts of pests and evaluate forest health.
DAS	Best protections possible for control of a given pest while allowing for habitability of tenants and the environment.
OPRD	Control pests harmful to health or aesthetic value of OPRD plantings and natural areas in a cost-effective, safe, and environmentally responsible manner. Employee highest professional standards. Use principles of IPM.
DSL (Common School Fund)	Use basic ecological principles to guide decision-making, while integrating a plan for restoration. Use BMPs.
DEQ	N/A
ODA	Keeping a pest/weed out of Oregon is the best pest management strategy. Prevention minimizes risk to the environment and human health.
DOC	Inmate rules of confinement
ODOT	• Maintain a safe, effective transportation system • Protect human health and minimize impacts to the environment/natural resources • Cost-effectively control vegetation while protecting worker safety

	Key Elements
ODFW (Fish)	-
ODFW (Wildlife)	• Identification – Species I.D., extent of infestation, control methods, work with local vector control districts • Prevention – Cleaning equipment, using weed-free hay, planting natives, conducting boat inspection stations with OMB • Control – Herbicides, pesticides, bio-controls, habitat manipulations, trapping
ODF (State and Private Forests)	Aerial surveys of forest insects and diseases with US Forest Service (60 years), routine detection and monitoring of pests, developing and implementing strategies, and research and monitoring
DAS	-
OPRD	Each park management unit must develop site-specific IPM to address local conditions and species. Emphasize prevention, cooperation, education, inventory, and design management techniques.
DSL (Common School Fund)	-
DEQ	N/A
ODA	Exclusion/prevention (external quarantines) and EDRR (survey, detection, eradication, monitoring)
DOC	Housekeeping and weekly sanitary inspections; monthly treatments for pests focusing on key problem areas.
ODOT	• Encourage continuous program improvement • Use more than one method of control • Use research and new methodology • Evaluate and be knowledgeable of management alternatives • Maintain adaptive and flexible statewide and district IVM plans • Incorporate IVM into planning, construction, maintenance, and operations • Provide training • Prevention • Program Coordinator • Notifications of herbicide use to public • Develop and implement BMPs

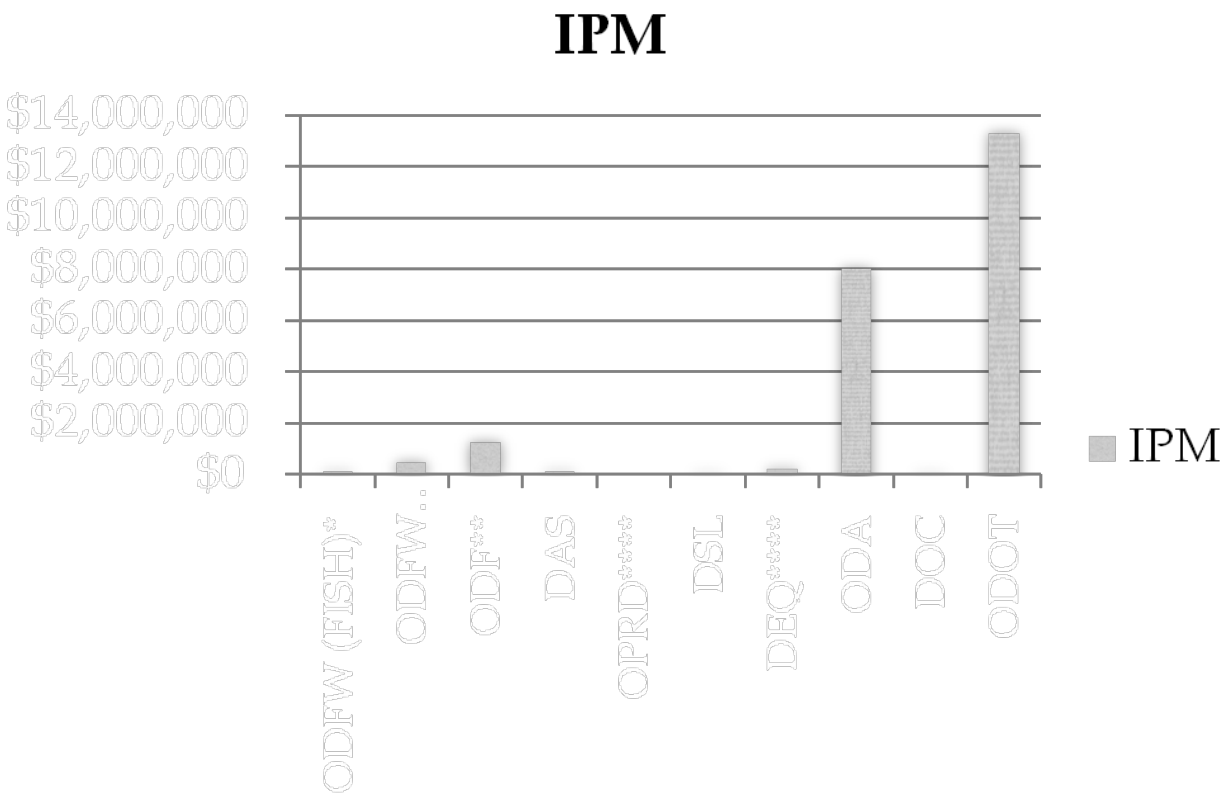
	Goals and Outcomes
ODFW (Fish)	• Reduce excessive loss of fish to predation and limit opportunities for predators to introduce pathogens to rearing environment • Restore ecological function and/or fishery benefit when using rotenone
ODFW (Wildlife)	• Reduce conversion of native habitats to weeds • Reduce destruction of habitat by insects and swine • Reduce vectors that could spread disease • Reduce impacts of burrowing mammals to infrastructure • Reduce potential establishment of aquatic invasive species transported by boats from other states
ODF (State and Private Forests)	State-managed forests: Achieve Greatest Permanent Value while minimizing the impacts of forest pests in an environmentally and economically sound manner to meet site-specific management objectives. Private forests: Encourage economically efficient forest practices and the maintenance of social, economic, and environmental benefits of forests
DAS	
OPRD	Cost-effective management of invasive and pest species while minimizing impacts on non-target species and use/release of pesticides in the environment • Minimize negative impact on human health and environment • Public outreach and awareness • Require licensed applicators • Evaluate effectiveness
DSL (Common School Fund)	• Reduce the spread of noxious weeds while treating new populations as they are discovered. • Secure funding for sustained weed and pest control over time. • Ensure robust reforestation of Common School forestland. • Enhance early detection and monitoring efforts.
DEQ	Environmental protection – reduce potential toxic chemicals and improve water quality.
ODA	Keep pests, plant diseases, and weeds out of Oregon.
DOC	Provide a clean and sanitary environment for inmates and DOC staff. Prevent the spread of disease.
ODOT	• Maintain a safe highway for the traveling public while avoiding and/or minimizing impacts to the environment and human health, protecting working safety, making cost-effective decisions. • Ensure alternative methods are considered and the most effective tools are used • Allow for adaptive management to modify techniques • Reduce by 25% the amount of herbicides used to manage highways in the next 5 years. • Use a multi-pronged approach based on BMPs

	Performance Metrics
ODFW (Fish)	• Monthly hatchery pond management reports • Liberation reports • Monthly progress reports • Fish Loss Report • Quarterly Predator Loss Reports
ODFW (Wildlife)	Surveys to i.d. weed and pest infestations, inspection of dikes and levees, work with local vector agencies to place mosquito traps
ODF (State and Private Forests)	• Compliance with forestry regulations • Biological integrity of forest streams (w/a desired trend of stable or improving indices of integrity) • Tree mortality from insects, diseases, and other damaging agents • Invasive species trends on forestlands and percent of aerially surveyed Eastern Oregon forests that are free of insect damage • Assessment of effectiveness strategies based on plantation versus desired condition • Contract compliance inspections and post-treatment inspections
DAS	Record keeping required by ODA, and when functioning, PURS records system.
OPRD	• Require licensed contractors to report pesticide application, quantities, location, and conditions. • Record keeping of pesticide application by trained staff for type, quantity, and conditions. • Evaluation of effectiveness for multiple controls methods.
DSL (Common School Fund)	• Repeated monitoring to show reduction in weed composition and increase in desired species composition. • Regular reforestation surveys
DEQ	Measurement of pesticide concentrations in surface and ground water over time.
ODA	Federally funded project – Environmental Impact Statement or Environmental Assessment is completed to examine environmental and human health risks.
DOC	Enforcing weekly safety, security, and sanitary inspection – 24 hour monitoring.
ODOT	• Effectiveness of treatments • Safety • Cost • Complaints • Legal Compliance

Agency Review of IPM Approach/Program

	Review Process
ODFW (Fish)	• Ongoing throughout fish-rearing process through review of monthly/quarterly reports • Comprehensive review of piscicides (rotenone) conducted in 2007 – produced *Guidelines for use of Piscicides in Oregon Waters*
ODFW (Wildlife)	• Ongoing review of IPM approach/program. Treatment success is visually confirmed; treatments re-applied as necessary
ODF (State and Private Forests)	• *Forestry Program for Oregon* reviewed every 8 years • Completed 2000 Aerial Pesticide Application Monitoring Final Report • 2002 BMPs Compliance Study • Ongoing collaboration with DEQ Pesticide Stewardship Partnership – South Yamhill River • State Forests Program – annual review of operations and goals
DAS	• Annual monitoring or tracking and review for efficiency of treatments
OPRD	• Invasive species committee meets quarterly to evaluate IPM implementation/effectiveness • Agency IPM and IS policy reviewed every 5 years • Ongoing review of species control methods and effectiveness
DSL (Common School Fund)	• Rangeland – Annual EBIPM staff training and periodic program efficiency reviews • Forestland – Annually, through ODF annual operation plan process
DEQ	• Annual reviews of pesticide water quality data
ODA	• Eradication projects conducted by ODA are usually funded through USDA and require an EIS or EA to examine environmental and human health risks
DOC	• Annual review of DOC contracts annually – involves safety managers
ODOT	• Annual review and update of district IVM plans • Annual review of statewide IVM plan • Vegetation management steering committee meets semi-annually • Currently undertaking comprehensive review of IVM program

Annual Costs for IPM



* Based on 22 hatcheries at $4,000/year for exclosures; does not include any chemical use
** Costs include only representative examples – not comprehensive agency costs - $400,000+ in ODFW (Wildlife) is for feral swine trapping and eradication
*** Costs were not provided
**** Estimated costs for 2 FTEs

Costs **DOC** Benefits

- Contracts for Pest Control
  - EcoLab Pest Elimination - $51,645
  - Eden Advanced Pest Technologies - $29,000
  - Paramount Pest Control - $3,545
  - Bugs B Gone - $3,750
  - Dobyns-Hart Pest Control - $1,400

- Prevent inmate disease
- Rodent control
- Insect control
- Reduced medical costs
- Pest control based on region

Costs **DAS** Benefits

- $90 - $100 of glyphosate

- Saved additional personnel costs for weeding – mechanical weeding is more costly and less effective than Glyphosate

Costs **ODOT** Benefits

- Mechanical vegetation control - $8.2 million
- Herbicide application - $2.6 million
- Statewide IVM Coordinator – $100,000
- Bio-controls – low cost

- Mechanical treatments minimize the use of herbicides and allows for effective management of large areas
- Herbicide applications are used on 20,000 acres of right of way
- Coordinator provides training, statewide oversight, and program coordination
- Bio-controls are long-lasting and reduce the need for intensive labor/material for noxious weed management

ODFW

Costs

- Costs of aquatic invasive species prevention and eradication varies
- Feral swine program is a pilot project – majority of costs are for trapping and tracking equipment
- County vector control districts bear most costs for mosquito control
- Cost of weed control depends on weed species, amount of acreage affected and methodology used
- Cost of predation at fish hatcheries varies
- Cost to apply rotenone to fish bodies varies depending on size of water body

Benefits

- Goal is 100% prevention of quagga/zebra mussels becoming established in Columbia River Basin
- Goal is 100% eradication of feral swine statewide
- Controlling mosquitoes reduces incidence of West Nile Virus, equine encephalitis and other diseases
- Weed removal allows restoration of native vegetative communities to support Oregon's native fish and wildlife
- Estimated 5% to 10% increase in smolt production due to reduction in predation at hatcheries
- Ecological restoration

ODF

Costs

- Sudden Oak Death Eradication Program - $1.2 million/year
- Statewide Aerial Survey, root disease ground surveys, insect early detection trapping, on-site technical assistance - $30,000-$50,000/ year
- Swiss Needle Cast aerial survey, monitoring, and cooperative research - $15,000-$30,000/year

Benefits

- SOD program prevents the spread of the disease and limits extent of federal and state quarantines
- Aerial and ground surveys, trapping, and technical assistance provides information on pest distribution and abundance, allowing federal, state, and private landowners to develop pest management plans
- Swiss Needle Cast project informs management decisions, helps to assess economic impacts, and prevents unnecessary use of pesticides

ODA

Costs

- Asian gypsy moth
- Sudden Oak Death
- Spartina
- Purple starthistle
- Distaff thistle
- Hawkweeds

A program to exclude 6 identified potential invaders from Oregon may produce a benefit-cost ratio of 34:1

Benefits

- AGM - Avoid $4.3 billion in losses/40 years to western U.S.
- SOD – Avoid $30 billion in losses to US commercial timber
- Spartina – Avoid $17.5 million in losses/year to OR
- PS – Avoid $12 million in losses/year to OR
- Distaff thistle – Avoid $4.5 million in losses/year to OR
- Hawkweeds – Avoid $12.5 million in losses/year to OR

DSL

Costs

- About $17,500/year
- $25,665/year
- Equivalent of one NRS 3 FTE in-kind costs

Benefits

- Controls and limits the spread of noxious weeds/ pests on rangelands
- Controls competing vegetation – including weeds and pests – so that replanted trees will survive and grow to maturity
- Addresses various IS issues at South Slough in upland and tidewater settings; monitoring; early detection; early intervention and control; prevention of new colonization events

Costs **OPRD** Benefits

- Chemicals
- Staff time
- Mechanical control
- Bio-controls
- Vegetation management through other means
- Agricultural and grazing leases
- Contractors

- Targeted control of invasive species
- Staff stewardship of resources
- Reduced toxicity
- Comprehensive resource management
- Use of partners and external resources

Additional Agency Comments

- DOC – IPM is essential for continued success
- DAS – Training on IPM would benefit our program
- ODOT
  - 2004 – ODOT developed a public notification system for herbicide spray schedules
  - Decrease of thousands of pounds of diuron from 2004 to 2009
  - 2007-2010 - ODOT implemented pilot projects on sections of US 101 and Lane County highway to control roadside vegetation without chemicals
  - ODOT will reduce by 25% the amount of herbicides used to treat non-noxious vegetation along Oregon highways in the next 5 years
- ODFW - Coordination of IPM among land manager is necessary to prevent infestations from occurring or spreading; education of public is crucial; Use of piscicides must be consistent with state and federal laws, state fish management plans and federal ESA recovery plans
- ODA – The Interagency IPM Coordinating Committee no longer served its purpose when IPM became a part of agency cultures – it is no longer needed; a review of state agency practices is a good idea to address deficiencies

Additional Agency Comments

- DSL – DSL use of IPM is specific to eastern Oregon lands and lands certified to be managed for DSL by ODF. ODF addresses IPM via forestry BMPs; on leased lands, the lessee is responsible for complying with state law
- DEQ – We identified high priority pesticides through our Toxics Reduction Strategy – stakeholders will be identifying actions to better manage these chemicals – this work could inform the use of IPM in Oregon
- OPRD – Our framework for IPM is to protect natural resources and ensure access to outdoor recreation – in the context of protecting the health and safety of people

	Agency IPM Training
ODFW (Fish)	• No training unless using piscicide (rotenone) – applicator must be licensed.
ODFW (Wildlife)	• Training for pesticide applicator's license, ODFW trapping license, ODF prescribed burn safety training, and Level II decontamination training (aquatic invasive species)
ODF (State and Private Forests)	• Strive to hire foresters with broad-based college level training, including IPM. • Annual performance evaluation, including review of training plan • Continuing education opportunities are available and encouraged • Pesticide applicator certification • State and national training sessions for insect and disease staff specialists • Yearly/regular workshops on outcomes associated with pesticide applications and vegetation management
DAS	• Training available through ODA accredited pesticide training classes and networking with our staff of 5 applicators
OPRD	
DSL (Common School Fund)	• Ecologically-based invasive pest management annual training
DEQ	
ODA	• ODA staff provide IPM training for Pest Control Applicators • Noxious weed control staff have Pesticide Applicator Licenses and continued education requirements • Helicopter applications are contracted • Attendance and presentations at conferences and trainings
DOC	• Safety managers have been primary point of contact for pest management; training of general staff has never been required
ODOT	• IVM training is provided twice a year for pest management staff. In 2010, over 100 ODOT employees attended training. ODOT's statewide IVM coordinator provides daily technical support