2001 Legislative Report

Progress Report for the Interagency Integrated Pest Management Coordinating Committee

(*as required by RCW 17.15.040*)

November 30, 2001

Prepared by Kyle Murphy, IIPMCC Committee Chair
Washington State Department of Agriculture

(These are the reports that met our deadline for submittal. There are additional reports that still may be submitted before final printing. We will submit any additional reports to be included in this document for review.)

Section I – Overview of IPM Report

Chapter 17.15 RCW, enacted in 1997, defines integrated pest management (IPM) 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 a state agency's programmatic pest management objectives. All state agencies and institutions of higher education that have pest control responsibilities are to follow principles of integrated pest management. The five elements of integrated pest management include:

1. Preventing pest problems;
2. Monitoring for presence of a pest problem;
3. Establishing tolerable levels based on plant/human health, economic and aesthetic thresholds;
4. Treating pest problems to reduce populations below established tolerable thresholds;
5. Evaluating the effects and efficacy of pest treatments.

The Washington State Department of Agriculture is the designated chair of the Interagency Integrated Pest Management Coordinating Committee (IIPMCC) and is required to prepare a report on the progress of integrated pest management programs carried out by state agencies and institutions of higher education by November 30 of 1997, 1999 and 2001. This document has been prepared to fulfill that requirement.

The Washington State Department of Agriculture has coordinated and participated in four IIPMCC meetings since the 1999 progress report. The meetings were held on April 5, 2000, October 18, 2000, April 5, 2001 and October 10, 2001. IPM coordinators from several state agencies and institutions of higher education, as well as guests from various organizations attended the meeting. Attendance ranged from 25 to 33 people. Pesticide re-certification credits were given to attendees that held pesticide licenses. These meetings were used as a platform for educating the attendees on the different aspects of IPM.

Since the last legislative report, the IIPMCC began creating the "Washington State IPM Implementation Handbook". The purpose of the handbook is to aid the States agencies and higher education institutions in the proper implementation of IPM. The IIPMCC has also formed a smaller advisory committee that is in the process of developing an IPM pilot project to help foster the education of proper IPM implementation.

Members of the IIPMCC Coordinating Committee are:

Agency or Institution of Higher Ed	Coordinators	Location	Phone
Department of Agriculture	Kyle Murphy	Olympia	(360) 902-1923
Department of Corrections	Larry Verlinda	Monroe	(360) 794-2354
Department of Ecology	Steve Strope	Olympia	(360) 407-6831
Department of Fish and Wildlife	Dave Heimer	Bellevue	(425) 562-2446
Department of General Administration	Mark Robb	Olympia	(360) 586-6205
Department of Natural Resources	Paul Penhallegon	Olympia	(360) 902-1604
State Noxious Weed Control Board	Lisa Lantz	Kent	(253) 872-2972
Parks and Recreation Commission	Dan Ingman	Olympia	(360) 902-8593
Department of Transportation	Ray Willard	Olympia	(360) 705-7865

Central Washington University	Leslie Wing	Ellensburg	(509) 963-3469
Eastern Washington University	Karen Wichman	Cheney	(509) 359-6466
The Evergreen State College	Mark Kormondy	Olympia	(360) 866-6000
University of Washington	Charles Easterberg	Seattle	(206) 543-7209
Washington State University	Douglas Walsh	Prosser	(509) 786-2226
Western Washington University	Tim Rinn	Bellingham	(360) 650-2879
Bates Technical Institute	Kenneth S. Lee	Tacoma	(253) 596-1581
Bellevue Community College	John Carroll	Bellevue	(425) 641-2474
Bellingham Technical College	Roger Adams	Bellingham	(360) 738- 0221
Big Bend Community College	Jim Tincher	Moses Lake	(509) 762-6214
Centralia College	Margaret Teitzel	Centralia	(360) 736-9391
Clark College	Jim Walker	Vancouver	(360) 992-2336
Clover Park Technical College	Jaye Nieves	Lakewood	(253) 589- 5597
Columbia Basin College	Dana Steichen	Pasco	(509) 547-0511
Community Colleges of Spokane	Becky Crow	Spokane	(509) 533-8630
Edmonds Community College	Stanley Linder	Lynnwood	(425) 460-1420
Everett Community College	Ron Busby	Everett	(425) 388-9512
Grays Harbor College	Janet Parker	Aberdeen	(360) 532-9020
Green River Community College	Tom Trindl	Auburn	(253) 833-9111
Highline Community College	Dave, Kress	Des Moines	(206) 878-3710
Lake Washington Technical College	Joel W. Potthoff	Kirkland	(425) 739-8100
Lower Columbia College	Ron Strobe	Longview	(360) 577-3460
North Seattle Community College	Michael Brokaw	Seattle	(206) 528-4597
Olympic College	Tim Hewitt	Bremerton	(360) 478-4595
Peninsula College	Rick Croot	Port Angeles	(360) 417-6553
Pierce College	Mark Turpin	Lakewood	(253) 964-6589
Renton Technical College	Joe B. Neagele	Renton	(425) 235-5839
Seattle Central Community College	Jeff Watts	Seattle	(206) 587-5439
Seattle Vocational Institute		Seattle	(206) 587-4650
Shoreline Community College	Bruce Abe	Seattle	(206) 546-4503
Skagit Valley College	Dennis Rohloff	Mt. Vernon	(360) 416-7751
South Puget Sound Community College	Harold Sutter	Olympia	(360) 754-7711
South Seattle Community College	B.J. Tanner	Seattle	(206) 768-6429
Tacoma Community College	Dave Klemetsrud	Tacoma	(253) 566-5207
Walla Walla Community College	Charlene Flanigan	Walla Walla	(509) 527-4318
Wenatchee Valley College	Pat Sprauer	Wenatchee	(509) 662-1651
Whatcom Community College	Bill Cochran	Bellingham	(360) 676-2170
Yakima Valley Community College	Mike Lane	Yakima	(509) 574-4610

Section II – Executive Summary

Implementation Challenges

This section of the executive summary highlights some of the challenges faced by IPM coordinators and addresses how these challenges might be mitigated. The challenges listed here were chosen collaboratively by the IIPMCC at the October 10th, 2001 meeting.

IPM Policy

An IPM policy is the cornerstone for a successful IPM program. The policy explains the institutions or the agencies position on pest management to administration, staff, faculty, students, parents and the public. This policy is also important for private pest control operators who might be under contract to control pest problems at the location.

The creation, approval and implementation of IPM policies by the administrations of the state institutions of higher education and the IPM coordinators at those locations, has been a major challenge. It has been difficult to change the "old system" of pest management for a number of reasons. The shift away from exclusive chemical control to a strategy of coordinated decision-making requires a commitment by the administration to the change and the resources to implement it.

The recommendations from the IIPMCC are:

- Requiring the administration at each location to adopt an IPM policy.
- Provide appropriate authority for the IPM coordinators position. Many of the institutions' coordinators don't have the needed authority to properly coordinator and run a successful IPM program. A properly developed IPM policy will assist in identifying the roles and responsibilities of the coordinator.
- Assure that when there is a construction of new facilities that the design, maintenance and landscape areas are coordinator with the goals of the IPM program. If properly developed, this would also be addressed in the IPM policy.

Lack of Resources

Another challenge faced by the states' institutions of higher education IPM coordinators is the lack of financial resources needed to develop a successful IPM program. Some issues identified by several coordinators are:

- The legislature budgets money to the schools for pest control and ground maintenance, but many times this money gets re-appropriated by the administration to other areas in response to budget shortfalls.

- The coordinators don't have the time or ability to compile the needed information or develop the training needed for themselves or their staff.

Cloudy Future of State IPM Program

Another challenge being faced by the IIPMCC is the unknown future of the statewide IPM program. The enacting Legislation, RCW 17.15 directs the IIPMCC to meet and develop a Legislative report until 2002. The IIPMCC requests direction from the legislature on how the program is going to proceed from here. The IIPMCC finds the twice-yearly meetings are very educational and helpful and would like to see these meetings continue.

Addressing Challenges

It has been four years since RCW 17.15 was enacted and the states IPM program created. The IIPMCC has identified several aspects of this program that have benefited the various agencies and institutions involved.

The main benefit brought on by the creation of the program is the improved communication by the various institution and agency IPM coordinators. This improved communication, mainly a result of the twice-yearly meetings, has helped many coordinators to learn different ways to carry out aspects of their IPM programs.

The IIPMCC is currently working on an IPM pilot project at the University of Washington that will develop interactive training tools and opportunities for IPM practitioners. This will allow the IPM coordinators at the institutions to continue their daily workloads, without depriving them of the needed training tools and opportunities for IPM implementation. Much of the work for this project is carried out by and advisory committee made of up IPM coordinators from the University of Washington, Western Washington University, Washington State Department of Ecology, and a representative from the Washington Pest Control Association. The IPM Coordinator from the Washington State Department of Agriculture chairs the advisory committee.

Another benefit is the training that has been made available through the IIPMCC meetings. These meetings not only serve as a forum for discussion and the passing along of useful information, but also have been used as a training forum for coordinators. Experts in different areas of IPM have presented at the meetings and provided great training in such areas as, proper IPM inspection techniques, how to formulate an IPM plan and how to approach different pest problems.

Section III - Agency and Institution Reports

The following section of the report is a compilation of individual reports from the each of the above named agencies and institutions. The IIPMCC created a report format to be followed by each individual agency or institution. Each report contains four sections, an update of the implementation process, the techniques being used, cost comparisons, and finally implementation problems being encountered. This will allow the reader to quickly and easily identify the area of interest.

The submitting party determined the content of each report. The Washington State Department of Agriculture did the technical editing and formatting. For more information about the integrated pest management activities of a specific agency or institution, please contact the agencies or institution's IIPMCC member listed above in this report.

Washington State Department of Agriculture

The Department of Agriculture (WSDA) does not own or manage state lands. The department, however, has a critical role in limiting or preventing or eliminating pest problems in Washington state.

WSDA Pest Program

Pest control duties in the department are centered in the agency's Pest Program. The goal of the Pest Program is to protect the state's resources by preventing the establishment of high-risk insects, plant diseases and weeds in the state. Staff conducts surveys and inspections, disseminate information and research, enforce agricultural quarantines, provide laboratory diagnostic services, review and oversee the release of genetically engineered and exotic plant pathogens by researchers, and carry out projects to eradicate pests such as gypsy moth and Spartina.

Entomology activities

WSDA's Entomology activities demonstrate integrated pest management in its fundamental form with emphasis on monitoring. Monitoring is accomplished through both extensive and intensive insect trapping. Each summer, throughout the state, thousands of gypsy moth, Japanese beetle, and apple maggot traps are used for early detection of incipient infestations. The IPM practices of treating when needed based on monitoring, and the integration of control methods are at the core of our efforts. For example, in the gypsy moth program, eradication efforts are based on monitoring data. In terms of integration, the gypsy moth caterpillar -- the most vulnerable life stage of the insect -- is the target and is primarily eradicated through the use of a selective, biological insecticide. However, additional methods, such as use of an insect growth regulator and even mass trapping of adult moths, have been integrated as warranted into the overall eradication strategy. An often-overlooked component of IPM, information delivery, is also included in our program. We present the IPM approach to stakeholder groups, ranging from residents in treatment areas, to agricultural commodity representatives, to citizens engaged in formal pesticide license re-certification activities.

In 1998 and 1999:

- Gypsy moths were detected at 17 and 15 locations, respectively. Eradication treatments were conducted at three locations in 1998 and two locations in 1999. Because the three 1998 treatment locations had no gypsy moth catches in 1998 and 1999, WSDA declared gypsy moth to be eradicated from those locations.

- Japanese beetles were not detected in Washington through trapping and only 14 dead specimens were found through inspections of cargo aircraft from the infested eastern states.

- The commercial apple-producing areas of eastern Washington remain free from apple maggot.

Weed control activities

WSDA is the lead agency for the control of Spartina and purple loosestrife and is responsible for noxious weed control in the counties without weed boards. The Pest Program's weed control activities are guided by the weed list adopted annually by the State Noxious Weed Control Board.

Spartina is a noxious aquatic weed infesting some part of more than 18,000 acres in western Washington. As lead agency, WSDA has coordinated the development of a statewide strategy and management plan for eradicating Spartina. The agency has streamlined regulatory process requirements by obtaining "umbrella" water quality permits, provided cost-share moneys to state and local government and private landowners, and explored with its partners more efficient and cost-effective ways to eradicate Spartina.

Integrated pest management -- or in this case, integrated weed management (IWM) -- continues to be the guiding principle for *Spartina* eradication efforts in Washington State. IWM establishes a systematic process for developing management goals and prioritizing activities on the basis of infestation type; preventing new introductions or infestation enlargement; determining abundance thresholds used to dictate when management activities are required; infestation monitoring; and public involvement. IWM allows selection from the following treatment methods to match the specific management requirements of each site.

- No treatment - This is the least preferred option. No treatment results in vegetative growth of *Spartina*, in addition to seed production.

- Mechanical Control - Repeated mowing could prevent seed production and reduce next season re-growth. Mowing can also reduce the amount of herbicide needed to eradicate *Spartina*. In 2000 and 2001, new equipment used to treat larger areas were put to the test on Spartina with much success due to the nature of the plant and the terrain.

- Herbicide (ground application) - Ground application using glyphosate is effective for treating *Spartina* clones and the fringe of meadows.

- Herbicide (aerial application) - Aerial application is effective at seed prevention and, in upper elevation *Spartina* meadows can reduce plant density. Aerial application is timed to coincide with the maximum susceptibility of the plant to increase efficacy due to the low amount of herbicide allowed when utilizing this treatment option.

- Manual Removal - Manual removal can be effective for removing *Spartina* seedlings and small clumps or clones. This work is time-consuming and labor-intensive.

- Biological Control – The University of Washington is the lead entity in the development of a bio control program. Currently the only agent being used on *Spartina* is a plant hopper called *Prokelesia marginata*. At the end of 2001 more than 200,000 insects have been released at three different sites in Willapa Bay and the pioneer population has laid an estimated 2 million eggs.

Treatment methods are chosen to maximize efficacy and to minimize negative environmental, economic and social impacts. At individual sites, they can be used in combinations, permitting variation in environmental sensitivity within the sites to be to be appropriately addressed.

Implementing IPM for the control of **purple loosestrife** in Washington State has been a top priority for several years. WSDA oversees only a portion of statewide purple loosestrife control efforts;

several other agencies and landowners with jurisdiction control purple loosestrife on their own. Enforcement, if any, is often at the county weed board level.

WSDA participates in cooperative projects with many agencies and landowners to address purple loosestrife. Projects involving WSDA use an Integrated Vegetation Management approach to control Purple Loosestrife. WSDA facilitates projects by issuing permits for the movement of plants to landfills that had been removed by manual or mechanical methods. These permits are required for compliance with the state's purple loosestrife quarantine. WSDA also prepares the necessary documentation to acquire permits from the Department of Ecology to apply herbicides to purple loosestrife.

WSDA purple loosestrife funds have been used to purchase equipment for use by WSDA and other weed control entities to collect biological control agents for redistribution statewide. Boats have been purchased to survey and monitor and treat infestations and are stored at various sites around the state for use by weed control entities. Hand clippers and plastic bags are available for use by community groups who are manually controlling infestations in sensitive areas. WSDA has paid for the proper disposal of purple loosestrife plants in some instances where the costs were prohibitive to the volunteer groups. Other purchases have included weed wrenches for pulling plants, backpack and boat mounted sprayers, and the herbicide Rodeo®. WSDA has a cooperative contract with Dr. Gary Piper of WSU to rear biological controls for the program.

More information on WSDA's Spartina and purple loosestrife control efforts can be found in the program's annual progress reports.

- Nursery inspectors in the department's **Plant Services Program** inspect plant nurseries to ensure that consumers and the nursery industry are provided healthy, pest-free and disease-free plant materials. The program also enforces agricultural quarantines to prevent pest introductions and, on request, provides inspection services to certify Washington nursery stock and plant materials as free from disease and insects as required by domestic and international markets.

- The department's **Seed Inspection Program** routinely samples lots of imported seed to insure seed standards for noxious weeds are met. The use of high-quality seed and mulch materials, which would be free of diseases and weeds, is promoted to United States Forest Service (USFS) and Bureau of Land Management (BLM) in roadside plantings, rehabilitation and erosion control work.

IPM In Schools Workgroup Report

Dr. Daniel A. Suomi, Pest Control Operator Specialist with the Pesticide Management Division, is the Washington State Department of Agriculture (WSDA) representative to the IPM in Schools Working Group. He is the current chair of the committee.

Committee activities conducted during the 1999-2001 biennium included:

- Quarterly meetings hosted by WSDA for Working Group members, consisting of school administrators and maintenance staff, environmental groups, regulatory personnel, concerned parents, citizens, and pest management specialists

- Worked for the successful passage of Substitute Senate Bill 5533, requiring prior notification of school pesticide applications and posting of signs at school treatment sites

- Produced a "How to Comply" technical document that provides guidelines to those required to operate within the new posting and notification legislation (completion date early 2002)

- Worked with representatives from Nathan Hale High School (Seattle School District) to develop integrated pest management (IPM) procedures on grounds and in buildings

- Conducted statewide IPM workshops for school pest managers in conjunction with members of the Washington State Pest Control Association (WSPCA) and Washington State University

- Currently developing a survey on school pest management practices for distribution to school administrators and maintenance personnel

- Developed, in conjunction with WSPCA, a CDROM to inform school administrators and maintenance personnel about IPM policies and practices

Washington State Department of Ecology

Section 1. Update of Implementation Process

Ecology IPM Policy
The policy became effective in February of 1998, and was revised in June of 2000. At that time an "Attachment A" was added to further outline "Roles and Responsibilities" of the IPM Coordinator, the Agency IPM Coordinating Committee, and the Facility-Specific IPM Committees.

Ecology IPM Coordinator
In April 2000, a new IPM Coordinator, Steven P. Strope took over the responsibilities of the IPM plan development of the Agency.

Ecology Headquarters Building Site Specific Committee
Continued with the site specific IPM Committee to develop an IPM site-specific action plan for the agency Headquarters facility in Lacey WA. This plan will be used as a template for other Ecology facilities to use as a starting point to develop their own site-specific plans.

The committee has been working under the following IPM objectives:
- Use the policy to establish the IPM plan development.
- Implement the 1997 legislation that requires state agencies to have IPM Plans (SSB5077) with regard to Department of Ecology facilities.
- Develop communication and marketing tools for public outreach and education.
- Use best management practices to implement IPM principles.

Ecology Site Specific Landscape Contract – Headquarters Facility
In June of 1999, the Department of Ecology (DOE) developed a request for proposal (RFP) for a Grounds Maintenance IPM plan for the Headquarters site facility. A contractor was selected from the process to implement landscaping objectives of the facility specific project. A one-year IPM landscaping contract was awarded on October 26, 1999 to the selected contractor (H&H Landscaping). The scope of work in the contract was implemented with direct guidance from the Agency, and the IPM consultant we have hired (Robert Berger).

At the time of this Report the Agency is developing a revised request for proposal (RFP) for a Ground Maintenance IPM contractor for the Headquarters site facility. We currently are using the original contractor but have found that the level of experience and training needed to fully monitor and document for the IPM process will require a more in-depth knowledge of Horticulture and Entomology. This will also be discussed in Section 3, "Implementation Problems.

Ecology Education and Outreach
In September 2000 an IPM website with information on IPM statewide and at the Headquarters facility was developed. The IPM website is located on Ecology's Intranet Facilities website. Content includes the following topics; IPM at Ecology facilities, techniques used at the Headquarters facility, pests found in and around Ecology facilities, photos of fruit fly traps created

by Ecology staff, Ecology's IPM publications, links to Chapter 17.15 RCW and other regulatory agency and educational information. [Fry, Steve; Kaynor, Kathleen]

Ecology Control of Spartina in Padilla Bay

The Department of Ecology owns a 10,000-acre site called the Padilla Bay National Estuary and Research Reserve. The Department of Ecology used IPM principles to control Spartina alterniflora and Spartina anglica in Padilla Bay during the 2000 and 2001 field seasons. The first year of control in Alice Bay (part of Samish Bay proper) took place in 2001. Alice Bay is outside the Padilla Bay N.E.R.R. boundary, but a few acres of mudflat in Alice Bay are owned by Ecology. Alice Bay is adjacent to northeastern Padilla Bay.

Control efforts have been underway since 1994 starting with wiper applications in 1994. The Reserve switched to backpack sprayer applications in 1997 to improve efficacy. The Reserve uses an Integrated Weed Management approach in which physical, mechanical and chemical methods of control are employed.

Our success can be attributed to careful annual monitoring, dedicated and careful control efforts, mowing prior to spray, spraying, and mowing again two weeks post-spray. As a point of comparison—on Dike Island in south Padilla Bay—what took a crew of nine three days to mow in 1997, two people mowed in an hour in 2001. We are down from a peak of 17.2 acres of total Spartina in 1997 to 0.144 acres in 2001.

2000 Activities

The shoreline of Padilla Bay (within N.E.R.R. proposed boundary) was surveyed late May and early June, 2000. Spartina alterniflora extent was recorded at 1.7-2.5 acres while S. anglica extent was 0.005 acres (19.3 sq. m).

Mechanical and physical control took place June 15-30. This consisted of hand-pulling seedlings, digging small clumps (<1 foot diameter) and mowing to the mud all Spartina clones greater than one foot in diameter. Backpack sprayers were used for chemical control on July 22, 24, 31 and August 1. The chemicals used were Rodeo (5%)/R11 (1%) and application was spray-to-wet. The second mow took place no sooner than 14 days post-spray. Dike Island and the Padilla Bay Gun Club were mowed only once, prior to spray. The Swinomish Spit, Padilla Bay Gun Club, and Dike Island Gun Club are areas still needing active control. All other areas are essentially a monitoring effort with minor control activities.

2001 Activities

The survey of Padilla Bay's shorelines took place from June 6-22, 2001. Spartina alterniflora totaled 0.14 ac this year (559 sq. m) and all but three small clumps were located on Dike Island. Spartina anglica totaled 0.004 ac (14.5 sq. m) with infestations on the Swinomish Spit, Swinomish Gun Club, Telegraph Slough and the Padilla Bay Gun Club. We did not survey offshore mudflat due to staff and budget constraints. Control in Padilla Bay took place June 6-13, July 27 and September 28. It consisted of digging and mowing. No chemical control was employed this season.

Padilla Bay NERR staff surveyed the south end of Alice Bay on June 27, 2001 and a cooperative control effort took place on July 5. Padilla Bay staff, a Swinomish Tribal crew, Skagit County

Noxious Weeds staff, and a Washington Dept. of Fish and Wildlife crew and airboat worked together to mow and dig Spartina anglica. Padilla Bay staff revisited the Ecology-owned mudflat August 29 to pull more seedlings and dig clumps. Our efforts were aimed at controlled seed set this year. It will take a concerted cooperative effort over the next 2-3 years to gain control of Alice Bay Spartina. Our best hope for complete control there will be combined digging, mowing, and spraying with herbicide.

In the areas where Spartina has largely been controlled, succession is either to mudflat or Spergularia marina and/or Salicornia virginica. The vegetation may change as root masses decay. With the exception of Dike Island, the infestation in Padilla Bay seems to be easily controlled by pulling and digging. Another year or two of chemical application (if allowed) on Dike Island would bring that infestation to the point where monitoring and digging will be all that is needed. Without chemical control, the infestation will regain vigor. We are trying to exhaust an enormous root mass at that site. We will continue to survey annually for new growth around the bay and to control new growth. [Riggs, Sharon]

IPM in Schools Project

A final report "Integrated Pest Management in Schools Project – Final Report" was published by the Hazardous Waste and Toxics Reduction Program, in August of 2000.
Publication Number 00-04-024.
Also published in late 1999 by the Hazardous Waste and Toxics Reduction Program, "Calculating the True costs of Pest Control". Publication Number 99-433. [Morgan, Peggy]

IPM and Water Quality

1. January 2001 – Southwest Regional Office, Water Quality Section:
   Signed a Memorandum Agreement between Ecology, Washington Department of Fish and Wildlife, Washington Department of Agriculture, Washington State Commission on Pesticide Registration and the Willapa/Grays Harbor Oyster Growers Association for the control of **Burrowing Shrimp**. The focus of the agreement is the development of an Integrated Pest Management Plan, which is due in March 2002, as a mechanism to control burrowing shrimp in the most ecologically manner possible. [Bentley, Boyd]

2. Integrated Aquatic Vegetative Management Plans (IAVMPs) were required for some of the lakes that requested herbicide applications in 2000. These plans were reviewed prior to issuing the 2001herbicide Orders. The first part of the IAVMP was due in 2001, and the second part which includes public comment and input will be required before the 2002 Orders are issued. IAVMPs are also part of the grant process.

   <u>IAVMPs were requested by the SWRO from the following Lakes:</u> Big Timber Lake, Little Timber Lake (submitted as a single IAVMP), Blue Lake, Clear Lake (submitted as a single IAVMP), Ken Lake (submitted), and Scott Lake. Scott Lake submitted a plan that was not approved. However Scott Lake was treated for invasive plant only this year. IAVMP's are not required for treatment of invasive plants.

   <u>Orders have not been issued this year and IAVMP requirements will need to be followed for next year on the following Lakes</u>: Scott Lake, Beaver Lake, Fawn Lake, Hicks Lake, Offut Lake, Trails End Lake and Steilacoom Lake, Lake Leprechaun and Lake Limerick. These lakes

did not apply for herbicide application this year. The requirements will follow over from 2000 to whatever year the next application is received. The language in the 2000 Orders was as follows. "After the 2000 treatment season, an Integrated Aquatic Vegetation Management Plan (IAVMP) will be required before any new orders will be issued for the use of aquatic herbicides in Whatever Lake."

Skiview Lake, Lake Louise, Gravelly Lake and Anderson Lake: the IAVMP was received and reviewed and an order issued.
Rainbow Lake, Star Lake, Elbow Lake, Lake Debra Jane, Trails End Lake, Lake Serene, Spanaway Lake, Pattison Lake, Lake Lucinda and Leisure Time Resort Pond: will start the process with the first part of their IAVMP information due in 2002.
Arrowhead Lake: has an IAVMP that was developed in 1992, we have requested an update to that plan accordance with our guidance document. [Hill, Margaret; Carroll, Kerry]

Section 2. Techniques Used

Headquarters Facility

- **Weed Control:** A decision to not initiate weed control in lawns and other grass areas at the headquarters facility has resulted in less pesticide use when compared to past seasons of weed control efforts. This reduction in lawn weed control efforts was possible without reducing aesthetic values because of new management practices for grass areas. Monthly monitoring of the grass areas is ongoing, and only spot treatment of targeted weed species is currently needed if they exceed the threshold levels established.
- **Insects:** Monthly monitoring of insect populations has identified the lack of need to initiate control measures, as predators and/or weather conditions have kept insect populations below action threshold levels.
- **Bark Nugget Mulch:** A major investment for long-term IPM benefit was made by placement of bark nugget mulch (no fines) to a depth of three inches over most ornamental planting areas in the spring of 2000. This resulted in reduced weed control efforts throughout the last two summers. Also, the water requirements were met in most shrub areas with conserved soil moisture, rather than supplemental irrigation. The reduced soil temperature, better nutrient levels, and reduced weed competition has allowed ground cover plants to begin closing at a rate faster than experienced without the nugget type mulch. The bark nugget mulch improved the appearance of the planting areas. We have expanded this investment to other planting areas in the spring of 2001.

Section 3. Implementation Problems Encountered

- **Expertise Required:** As mentioned previously in the update section for the headquarters site-specific committee, we are finding that the level of knowledge needed to perform regular site monitoring for the varieties of pests and/or problems in the Plant, Insect & Animal categories alone are extensive. We have to date employed both a Landscape contractor, and an IPM Consultant. The Landscape contractor to maintain the landscape as directed and the IPM Consultant to help monitor, research, and recommend & specify alternatives. We are hoping to find a Landscape contractor with a broader background to allow us to combine many of these functions into a single contract.
- **Staff Time – Committee Participation:** Dedicated staff time for continued committee participation and research time to follow up on leads and/or ideas that we currently must use

contracted services for. Such as Herbicide and Pesticide revues, market research for new tools/methods for weed control, etc.

- **Staff Time – IPM related work:** Dedicated staff time to compile the ongoing IPM documentation from an ongoing IPM program – whether Site Specific or Agency Program.

Section 4. Cost Comparison

The Agency headquarters facility in Lacey, WA. has transitioned from standard landscape practices (1993-1999), to IPM based landscaping principles (10/1999 – present). The following table shows average monthly costs (average monthly costs used due to incomplete records for some years) for landscaping services from calendar year 1995 through June of 2001. As you will note, the costs for the first full year of the IPM program "spiked" as we invested in some changes in the landscape program that will have long term paybacks in reduced labor costs. In the second year we have started to level out and are already seeing reduced hours of labor in some areas.

Calendar Year:	**Average Monthly Costs:**
1995	**$3,124.60**
1996	**$3,732.30**
1997	**$3,732.30**
1998	**$3,996.30**
1999	**(Jan-Sept) $3,996.30, (Oct-Dec)$3,236.23**
2000*	**$6,719.62**
2001 (Jan-June)**	**$4,087.73**

** The 2000 calendar year reflects major investments in areas such as 250 yards of 2" Bark Nugget placement on many surface bed areas for long-term reduction of weeding labor. Also reflected is the combined cost of a Landscape Contracting Service and a Landscape Architect / IPM Consultant to oversee and monitor the IPM implementation process.*

** The 2001 numbers reflect the first six months of available data. We have continued to invest in additional Bark nugget placement and continue to use the services of both contractors. As you can see the 2000 investment has already begun to pay off as the monthly average is dropping nearer to 1999 levels.

Washington State Department of Fish and Wildlife

Introduction

The Department of Fish and Wildlife's goal is to preserve, protect, and perpetuate fish, wildlife and their habitat in the state of Washington. To accomplish this goal the Department manages 24 major Wildlife Areas and other sites covering 820,000 acres of diverse habitat, from estuaries on the Pacific Coast to shrub-steppe communities in eastern Washington. Working in cooperation with federal, tribal, state, county and non-profit organizations, and private citizens, the Department utilizes integrated pest management (IPM) to develop effective and cost efficient solutions for localized and regional pest problems.

IPM is a prioritizing and decision-making model used for choosing the most effective, environmentally sensitive and economical pest control strategy for specific problems. This includes, but is not limited to education, prevention, inventory, control methodologies (e.g. mechanical, herbicide, hand, bio-control, re-vegetation, etc.), monitoring and follow-up treatments. These elements are used together, in sequence, and/or singly depending on the problem, associated circumstances and budgets. Our goal is to maintain desirable habitat on a site, or if pests are established, use effective control to return the site to desirable habitat conditions which discourage pests.

There is a misconception that landscapes, if left untended, will develop into healthy, functioning ecosystems. Unfortunately, due to a burgeoning human population, nearly 200 years of habitat modification, increasing demands by consumptive and non-consumptive natural resource user groups, and invasive pest species, this ideal is unrealistic. Invasive plant and animal species were recently cited in a federal study as the second worst threat to native systems in the United States, behind only actual habitat loss. The most effective and economical method of managing invasive or pest species is to prevent their establishment. The Department, through Wildlife Area Managers, Enforcement Officers, Access Managers, field personnel, and Vegetation Management Team, continually monitors and assesses habitat conditions. Through this effort, potential pest problems can be identified, evaluated, and managed as quickly as possible, increasing effectiveness and keeping costs down. For example, pulling pioneering *Spartina* seedlings in Grays Harbor during biannual weed surveys takes little time or budget and removes the problem plant.

In situations with an already established and widely distributed pest, the Department uses IPM to develop short and long-term strategies to mitigate pest impact on desirable wildlife habitat and agricultural systems.

IPM is used by WDFW in three general areas: vegetation management, aquatic nuisance species (ANS) control, and wildlife control.

Vegetation Management

The Department conducts weed control activities to maintain and enhance habitat, and meet requirements of the Washington State Noxious Weed Law (RCW 17.10). Washington State Noxious Weed Control Board's 2000 Noxious Weed List contains 111 non-native invasive plants. This law prioritizes listed species and mandates landowner control of certain weeds on the list.

Using IPM, the Department combines a variety of timely weed control tools, synergistically, to achieve control on its lands and be a good neighbor.

One of these tools is biological control. The Department uses over 13 species of host specific insects to naturally reduce and control six invasive weed species. In eastern Washington, biological control for knapweed has been combined with competitive vegetation planting and sometimes grazing exclusions (another element of IPM) to allow native and desirable vegetation to regain a naturally weed resistant population density. In addition, by using an integrated approach, herbicide applications can then be selectively timed and applied to avoid desirable vegetation while eliminating noxious weeds. This improves overall control effectiveness.

Although aquatic weeds overlap into the Aquatic Noxious Species (ANS) control category, their management closely resembles traditional terrestrial weed control activities and is therefore included in the vegetation section here. The Department's responsibility for wetlands and tidelands includes managing noxious weeds. We often combine several weed management methods for their complimentary effect in programs to control such species as purple loosestrife (PLS) (*Lythrum salicaria*), *Spartina alterniflora*, and *Spartina anglica*.

By using IPM principles and the appropriate tools we have established an extremely effective program for PLS control. We apply a strategy using several complimentary techniques These include public awareness of the problem, inventory, herbicide application, fire, mechanical removal, and investment in biological control research, establishment of insects and re-vegetation. Educating the public and promoting public involvement is considered essential. The Department published a PLS brochure, which helped identify the species, its threat and a brief outline of control suggestions. A manual, Organizing Volunteers to Control Purple Loosestrife, was also published to assist in getting people together to do hand removal. These documents have been widely used by counties and many others to coordinate volunteer projects for controlling PLS and other weed species.

Several biological control agents for PLS were researched with the help of WDFW and released in the early 1990's. *Galerucella*, a leaf-eating beetle, was so prolific and successful in damaging PLS that several collections for re-distribution have been held in the last three years. An intensive effort has been made during 2001 to inoculate large infestations of PLS along the Chehalis River with Galerucella with the help of a Washington Department of Ecology Aquatic Weed Grant.

Herbicide treatments are used on PLS where they are the best alternative. This includes small isolated patches, new infestations and for follow-up on other treatments where continual seedling emergence must be stopped. On larger patches where initial herbicide applications have been done, burning is used to reduce the standing biomass and allow more effective re-application on new or regrowth.

Another example of using the IPM process is *Spartina* management. Since 2000, WDFW has treated the equivalent of over 300 acres of solid *Spartina*. Treatment occurred over a very wide area in densities from scattered seedlings in Grays Harbor, to total monoculture stands in parts of Willapa Bay and North Puget Sound. Treatment for *Spartina* is site specific depending on seasonal, biological and physical conditions. We combine inventory, mowing, herbicide treatment, hand removal, monitoring and follow up, often coordinated with other weed control partners. Biological

control has been released in a few dense stands in Willapa Bay and is being monitored for efficacy as part of a UW-ONRC project.

In 2001, WDFW has been focusing on developing large-scale mechanical methods to control *Spartina* meadows. Prior work has shown that crushing by tracked vehicles can result in significant control. Equipment tested in 2001 can produce five times the acreage treated by the previous best mechanical control method available. This increase in efficiency is particularly important at reducing seed production, thereby preventing new infestations. Preliminary results show as good or better efficacy than other mechanical control methods, although it will be 2002 until the true effects are known.

Agricultural production of grain and alfalfa on Wildlife Areas throughout the state provide supplemental food for wintering wildlife and migratory waterfowl. This agricultural activity incorporates agronomic crop management and an IPM strategy. This strategy reduces disease and weed and insect pests through tillage, crop competition, and crop rotation, thus minimizing pesticide and fertilizer use.

Forest management practices used by WDFW are designed to increase habitat value for associated dependent wildlife. IPM is used to identify potential tree pest species, establish thresholds, and determine treatment options, including various designs of salvage logging of infected timber stands. Logging damaged trees is usually done during winter to minimize the possibility of pest species moving off-site and to reduce site impacts from tree removal. Increasing the distance between stands of healthy trees slows the spread of timber pests. In addition, burning is often used to stimulate shrub growth and reduce potential of pest spread from logging slash. Revegetation is conducted on logged sites to provide wildlife forage, reduce erosion, and compete with weed species that would otherwise invade a more open, disturbed site. Recent discussions between state and federal agencies may result in joint projects designed to more effectively combat pests such as spruce budworm, Douglas-fir tossock moth, and ponderosa pine beetle through more coordinated management practices.

Aquatic Nuisance Species

In 1998 the Aquatic Nuisance Species Management Plan was developed in response to the threat that both freshwater and marine invasive organisms pose to Washington's natural resources. The plan was not premature as the first green crabs (*Carcinus maenus*) were captured during 1998 in Willapa Bay. Legislation, that same year, provided funding for their prevention and control. Currently, green crab monitoring/control takes place in Willapa Bay, Grays Harbor, and Puget Sound (monitoring only) using baited traps. In addition, valuable baseline data on native fauna is being collected concurrently and will be used to evaluate future green crab impacts.

Preliminary catch data in Willapa Bay indicates a reduction in catch-per-unit-effort from 1998 to 2001. This decline may be attributable to a lower green crab population or to changes in Pacific Ocean currents thought to bring larvae to the region. However, captured gravid (egg bearing) females and new year classes suggest a small resident population in Willapa Bay. Further trapping may result in effectively curbing this population's breeding success.

In addition, WDFW has entered into a partnership with the Washington State Patrol to inspect large commercially hauled boats at weight stations for ANS. Inspectors, trained by Department staff,

have intercepted three boats (which were subsequently cleaned) with exotic mussels attached to the hulls. Further legislation is proposed to increase the effectiveness of this inspection process thereby preventing new ANS introductions.

Ballast water is thought to be a vector for ANS species entering Washington coastal waters. Recent legislation addressed the risk of unregulated ballast water exchange by establishing ballast water management and monitoring guidelines for vessels entering state waters. The legislation will require ballast water to either be treated or exchanged at sea prior to discharge to reduce the risk of introducing a deleterious organism to Washington waters. This preventive step is a goal of IPM.

Wildlife Control

The Department's lawful responsibility and mission of protecting and perpetuating Washington's wildlife can lead to pest management issues. Some wildlife, when their numbers, presence or activities impact human health, safety, and/or property, become pests and be termed "nuisance wildlife" requiring IPM. Public education (prevention) is a significant component of nuisance wildlife management. For instance, explaining to a homeowner that removing potential food sources, such as a pet's outdoor dish, may prevent unwanted wildlife, like raccoons and skunks, from being attracted on to the back porch.

In some cases WDFW pays damage claims for commodities damaged by managed wildlife. The Department also utilizes a cost-share fencing program to reduce repeated damage claims. WDFW also issues trapping permits when no other method is deemed reasonable. However, Initiate 713 significantly reduced the number of trapping licenses sold and also limits nuisance wildlife control operators to using live traps in most instances. The long-term effects of this initiative are yet to be seen as previously trapped wildlife populations grow and human-animal interactions/confrontations increase.

Conclusion

The Department of Fish and Wildlife's goal is to preserve, protect, and perpetuate fish, wildlife and their habitat in the state of Washington. Unfortunately, both noxious weeds and undesirable pest organisms are becoming more abundant in kind and number, complicating this mission. Only by using a thoughtful, coordinated and integrated approach, like IPM, do we have any chance to eradicate or contain them at acceptable levels.

Washington State Parks and Recreation

Update of Implementation Process

Staff of the Washington State Parks and Recreation Commission remain dedicated toward the full implementation of Integrated Pest Management (IPM) planning as a coordinated decision making process. This process serves as a model for determining the most appropriate pest control strategy for any given pest management issue. Land managed by the Commission includes 125 State Parks totaling approximately 84,000-forested acres and 165,000 non-forested acres statewide.

Progress to date includes adoption of agency directive entitled "Integrated Pest Management Policy". This directive identifies and defines IPM as a process. It gives direction and delineates responsibilities for various agency staff consistent with the intent of the principles of IPM as declared by Chapter 17.15 RCW. The policy directs staff to prepare individual park IPM plans once a treatment action is determined necessary. The agency has conducted one eastern Washington IPM training and one western Washington training for park management staff with significant pest management responsibilities. This past noxious weed season, 10 individual IPM plans were created by local park managers following our new process. We have more than 20 plans remaining to develop as staff time allows, hopefully within one to two years. The process has appeared difficult for some of our staff and we are currently reviewing this process in hopes of creating a simpler plan process to follow. Although our IPM and process format looks different than the draft handbook prepared by the IIPMCC we believe our process works better for our agency management structure and still incorporates all of the pertinent issues of IPM. The agency has a part time coordinator who oversees the implementation of this 1997 legislative mandate.

Techniques Being Used

Dalmatian toadflax at Peshestin Pinnacles State Park has been an enormous problem during the past years. We have used many different approaches to control this noxious weed, ranging from repeated chemical spray applications to organized volunteers or correction crews pulling the weeds. This year, we have added an informational poster on our bulletin board stating our problem, describing the plant and displaying pictures. We are requesting park users, generally rock climbers, to assist us by pulling the weeds and depositing them in specifically marked waste cans. This effort is a creative plan that has been very beneficial in this particular situation as the observed population of Dalmatian toadflax is diminishing.

Another example of a successful IPM prescription is Scotch broom at Millersylvania State Park. For years, Scotch broom had continued to invade and destroy the various uses of valued parklands. This weed had covered over a historic orchard site, covered recreation sites once used by the public, and eventually infiltrating naturally vegetated areas intended to be preserved for their natural beauty and values. Often, good IPM for noxious weeds requires that you establish new vegetation on a site that will effectively compete and eliminate or keep the weed under control. Two basic plans are successfully being used. The first prescription simply calls for mowing of large scotch broom sites and converting them into lawn areas. The grass establishes easily and regular mowing brings the Scotch broom under control. A second option with the Scotch broom has been to mechanically pull it with weed pullers in natural areas where a good supply of native vegetation already exists. Eventually, the large Scotch broom plants are removed and the site is covered in natural vegetation

that limits broom regeneration. With yearly monitoring, mowing and pulling, this weed is being very substantially reduced and intended land use restored.

Implementation Problems Being Encountered

A significant problem to implementing IPM in our agency is the lack of a full time IPM program coordinator. Our IPM coordinator only expends about 10% of time working with the IPM program. We need a full time coordinator to do the job properly but do not anticipate funding for this in the near future. We are doing the best we can with very limited staff resources going to this effort. We do have staff experienced in implementing IPM, however, their duties and priorities have been on other critical functions of the agency and they cannot spend the time developing IPM projects as we would like.

Another fundamental problem we face is enough staff specialists to address the implementation of each park's individual IPM plans. Old, traditional style pest management generally included a single treatment approach, such as simply spraying chemicals year after year. IPM has now become a system that often combines multiple, integrated control techniques. We know these integrated strategies are the way to go, but they are more complex, requiring more experienced staff time dedicated to each IPM plan and more equipment, such as heavy brush mowers. We do not currently have and do not anticipate any increase in these resources in the near future. Many IPM techniques are labor intensive. While volunteers help, we lack sufficient resources for many labor-intensive approaches.

Simply acquiring one FTE for a full time IPM Coordinator and supporting funding for specialized equipment purchases would be the single most help. These IPM plans are working, and the agency is proceeding ahead. However, lack of resources is slowing progress.

Cost Comparison

Washington State Parks has no significant cost comparison data that would accurately analyze different pest management strategies and their relative costs and effectiveness in a concise, objective manner. The biggest observable fiscal impact we see is that we continue to identify potential pest management problems. We cannot accomplish the projects in an effective IPM manner primarily because of the lack of staff to aggressively pursue pest issues. We do work the highest priority concerns, but that is all. There is far more to do than we have resources.

Modern IPM pest management strategies generally require considerably more labor and equipment costs and staff expertise up front. However, IPM can eventually lead to the elimination or control of a pest by wisely changing the conditions that allow the pest to thrive. Traditional methods of spraying pesticides seldom modify the conditions that allow a pest to thrive and often do not address the real problems. Compared to repetitive spray programs, the IPM approach may be expensive in the short run, but may ultimately be less expensive over time. IPM is the responsible way to approach more lasting pest management solutions.

Washington State Department of Natural Resources

1. Vegetation Control on State Forest Land

DNR manages 2.1 million acres of forestland for various trust beneficiaries. Revenue generated from these lands, primarily from the sale of timber, funds the construction of schools, universities, Capitol grounds, penal institutions, and other public facilities. In the management of these trust lands, the Department employs many tools to regenerate, raise, and tend to the creation of healthy forests.

DNR's management of forestlands follows a decision-making process outlined in the agency's Forest Resource (Policy) Plan and Final Environmental Impact Statement. Policy No. 33 of that plan defines the process used by DNR foresters and managers when considering vegetation treatment options. This process is further detailed in the Department's Forestry Handbook.

The need for vegetation control is based on an evaluation of the effects of competitive stress (by competing plants) on the young forest. If it is determined that competitive stress will indeed prevent the future desired stand (forest) conditions, vegetation control is then prescribed. This follows an evaluation of competitive species, likely response of crop trees, local constraints, operational feasibility, and economics.

In cases where treatment is judged desirable, options include:

1) No treatment and the foregoing of significant future revenue;
2) The use of mechanical and manual techniques, and cultural practices to control vegetation; and,
3) The use of herbicides to control vegetation.

The treatment selected must be biologically effective, operationally feasible, economically sound, and ecologically as well as socially acceptable. All treatments are compared to "no treatment." Forest Practices Rules and pesticide label directions dictate buffers along water bodies, residences, and agricultural settings.

Pest problems primarily consist of two basic groups of vegetation: weeds (grass and forbs) and brush (woody plants). Both are evident to varying degrees prior to timber removal and will re-sprout or invade a disturbed area. Nature creates a constantly shifting complex of plants around, over and under the desired trees. Unwanted vegetation can be a persistent nuisance, but is not always a detriment.

In established plant communities, a formal vegetation survey is used to gauge competitive stress on crop trees. The survey measures several parameters: crop tree diameter and height, vegetation species, and height of competing vegetation. Potential treatments are further evaluated when competitive stress exceeds threshold levels. DNR's vegetation control program does not seek to eliminate competition; rather, it seeks to control weeds and brush to a level that prevents competitors from dominating or impairing the growth of crop trees.

In 2000, from a forestland base of 2.1 million acres, DNR had more than 100,000 acres with potential vegetation competition problems. Of that acreage, competing vegetation was hand cut on 8,642 acres while 10,692 acres were treated with herbicides. Of those 10,692 acres, herbicides were manually applied using ground-based techniques on 5,907 acres; and, herbicides were applied by low-flying aircraft on the remaining 4,785 acres.

Shortly after a treatment has been completed, a visual evaluation is performed to gauge treatment effectiveness and to assess whether crop trees are "free-to-grow". This criterion is defined as crop trees remaining dominant over weeds and brush. This inspection also evaluates how quickly another treatment may be required. About 30% of once-treated sites require a second treatment.

2. Pest Control at DNR Seedling Nursery

DNR operates a seedling nursery south of Olympia. DNR's Webster Nursery raises trees for reforestation of state trust lands and for sale to private landowners. In 2000, the Webster Nursery raised 14.5 million seedlings on its 270 acres.

Webster Nursery's primary pest control objective is to manage pests so they impact no more than 5% of its crop. The nursery uses an integrated pest management approach to controlling pest populations. It includes crop rotation, irrigation methods, timing of plantings, and crop location. Pesticides used at Webster Nursery are limited to those labeled for forest nursery application; they are applied according to all written rules and labeled safety guidelines. Because hand weeding is the most effective method of weed control, Webster Nursery follows strict directives to prevent weeds from blossoming. To minimize weed populations, a pre-emergent herbicide is usually applied after a crop has been transplanted or sown. Any weeds appearing thereafter can be controlled by periodic hand weeding. The entire nursery is hand weeded at least three times annually.

Fungus is controlled by strict irrigation practices, both in the bareroot fields and in the greenhouses. The crop is irrigated first thing in the morning so the foliage is dry by nightfall, thus eliminating the prime conditions for fungus growth.

The only time the nursery applies a fungicide is when crop damage affects more than 5% of the population. Damage greater than 5% represents an economic loss. Due to the sensitivity of certain tree species, e.g., east side pine and larch, fungicides are applied once every ten days. This has proven successful and losses due to fungus have been minimal. It has not been necessary to apply crop insecticides during the last 10 years.

3. Noxious Weed Control in Natural Areas

The Department manages approximately 113, 400 acres at 47 Natural Area Preserves (NAP) and 27 Natural Resource Conservation Areas (NRCA). During the past 29 years, the state of Washington has acquired these extremely valuable heritage lands at a cost of more than $320 million. These include lands identified by Natural Heritage and Natural Areas Program staff, Department field staff, and citizens. They are selected for their unique ecologic, scenic, historic, and public use values. These lands are invaluable in helping state citizens understand the crucial role designated natural areas play in the stewardship of their natural heritage.

Noxious weeds are the primary pest issue in Washington's natural areas. Because of their invasiveness and local ecological impact, the species of greatest concern on the west side are spartina, purple loosestrife, mouse ear hawkweed, scotch broom, Japanese knotweed, and parrotfeather. Of greatest concern on the east side are diffuse knapweed, meadow knapweed, dalmation toadflax, yellow starthistle, rush skeletonweed, mullein, baby's breath, Russian knapweed, musk thistle, and bull thistle. The following table summarizes DNR's 2000 and 2001 weed control activities.

Table 1. Pest management activities in Washington's Natural Area Preserves and Natural Resources Conservation Areas

2000			
Non-Native Target Species	Control Activity	Number of Natural Areas	**Level of Effort**
scotch broom	**Chemical** (herbicide - Triclopyr) and **Mechanical** (hand pulling with weed wrenches and mowing)	3	30 acres (mowing) 10 acres (herbicide) 2 acres (weed wrench)
mouser hawkweed	Survey and **Chemical** (herbicide application - Glyphosate)	1	200 plants
spartina	Survey and **Chemical** (Glyphosate)	2	10 acres
purple loosestrife	Survey, **Mechanical** (hand pulling and removing from site) and **Chemical** (spot herbicide application - Glyphosate)	1	1 acre
diffuse knapweed, spotted knapweed, rush skeletonweed, dalmatian toadflax	**Mechanical** (hand-pulling, grubbing, lopping) and **Chemical** (spot-application of Glyphosate, Clopyralid, 2,4-D, Picloram, Metsulfuron, and/or Dicamba)	9	35 acres
mullein, yellow starthistle, Himalayan blackberry, baby's breath, common houndstongue, bull thistle, musk thistle	**Mechanical** only (hand-pulling, grubbing, lopping)	6	6.5 acres
Russian knapweed,	**Chemical** only (spot-	5	22 acres

white-top, leafy spurge, Russian thistle, sulfur cinquefoil	application of Clopyralid, Glyphosate, 2,4-D, Metsulfuron, and/or Picloram; broadcast application of Glyphosate)		
kochia, Canada thistle	**Mechanical** (hand-mowing) and **Chemical** (spot-application of Glyphosate, Clopyralid, and/or 2,4-D)	2	3 acres

2001 (through September)

Target Species	Control Activity	Number of Natural Areas	**Level of Effort**
scotch broom	**Chemical** (herbicide - Garlon 4) and **Mechanical** (mowing and hand pulling)	3	15 acres (mowing) 30 acres (herbicide) 10 acres (weed wrench)
mousear hawkweed	Survey and **Chemical** (herbicide - Glyphosate)	1	300 plants
spartina	Survey and **Chemical** (herbicide - Glyphosate)	1	2 acres
purple loosestrife	Survey, **Cultural** (hand pulling and removing from site) and **Chemical** (spot herbicide application - Glyphosate)	1	1 acre
Japanese knotweed and Himalayan blackberry	**Mechanical** (mowing and native plantings) and **Chemical** (herbicide - Glyphosate)	2	1 acre
Canada thistle	**Chemical** only (2,4-D)	1	0.1 acre
diffuse knapweed, spotted knapweed, rush skeletonweed, dalmatian toadflax	**Mechanical** (hand-pulling, grubbing, lopping) and **Chemical** (spot-application of Glyphosate, Clopyralid, 2,4-D, Picloram, Metsulfuron, and/or Dicamba)	8	30 acres
mullein, yellow starthistle, Himalayan blackberry, baby's	**Mechanical** only (hand-pulling, grubbing, lopping)	7	5 acres

breath, common houndstongue, bull thistle, musk thistle			
Russian knapweed, white-top, leafy spurge, Russian thistle, sulfur cinquefoil	**Chemical** only (spot-application of Clopyralid, Glyphosate, 2,4-D, Metsulfuron, and/or Picloram; broadcast application of Glyphosate)	5	20 acres
kochia, Canada thistle	**Mechanical** (hand-mowing) and **Chemical** (spot-application of Glyphosate, Clopyralid, and/or 2,4-D)	2	3 acres
reed canarygrass	**Mechanical** only (mechanized mowing and prescribed cattle grazing)	1	75 acres

Below are two examples of IPM approaches used by the Natural Areas Program:

Trout Lake Natural Area Preserve: Experimental, prescribed cattle grazing was used at this site to suppress approximately 50 acres of reed canarygrass. A separate 25-acre population of dense reed canarygrass was mowed to 4" stubble height in 2001. The effectiveness of both methods is being evaluated through qualitative and quantitative monitoring. This site also has populations of both diffuse and spotted knapweed. In 2000, the Department treated approximately 1 acre with herbicide and hand-pulled approximately 2 acres. In 2001, no herbicide was applied due to the success of the 2000 treatments, but knapweed was hand-pulled on approximately 3 acres, including a newly-discovered population. Common houndstongue was removed from a small $1/10^{th}$ acre patch by grubbing out the plants and roots. Volunteers, Northwest Service Academy (AmeriCorps) members, and field staff have all been crucial to conducting weed control at the site.

Mima Mounds Natural Area Preserve: Scotch broom invaded Mima Mounds Natural Area Preserve and National Natural Landmark in the late 1970s. The Natural Areas Program started controlling broom in the early 1990s using prescribed fire, mechanical pulling (hand pulling using volunteers and inmates with weed wrenches), mowing (primarily to prevent flowering and seed set), and herbicide application. In 2000, the department entered into a partnership with The Nature Conservancy to promote stewardship activities on the state's natural areas, resulting in more money and effort being focused on Mima Mounds broom control than at any time in the past. In 2000 and 2001, the Department used a combined approach of mechanical pulling, mowing, and herbicide application. Herbicides are applied using a cut-stump method and backpack spraying. Herbicides are applied when there is little or no wind. Every effort is made to only apply herbicide to the target plant. In the past two years, the Department has mowed 45 acres of broom, applied herbicides to about 40 additional acres, and hand pulled another 11 acres or so. This level of activity has made a

considerable dent in the Mima Mounds scotch broom population. Volunteers, Department staff, The Nature Conservancy staff, and Cedar Creek inmates have contributed to this effort.

4. Noxious Weed Control on Aquatic Lands

DNR manages 2.4 million acres of aquatic lands. The control of noxious and invasive weeds on state-owned tidelands, shore lands, and bedlands is of great concern and importance to the Department. Guidance on this matter is detailed in a 1993 environmental impact statement (EIS) titled "Noxious Emergent Plant Management." This EIS specifically discusses available weed control methods for wetland and estuarine noxious weeds, including physical, mechanical, chemical, and biological methods.

DNR's *Spartina* Control Program uses an integrated pest management approach to the removal of *Spartina alterniflora* from state-owned aquatic lands. *S. alterniflora* is a highly invasive cordgrass that is rapidly spreading throughout the mudflats and marshes of Willapa Bay and Puget Sound. Legislative efforts have directed various state agencies to control invasive *Spartina* species.

In past years, the state's approach to removal of *Spartina* from Willapa Bay and Puget Sound has included laborious hand digging and pulling up of the plant's roots, as well as mowing with hand-held brush cutters. More recently, DNR has worked with the Washington Department of Agriculture and Washington Department of Fish and Wildlife to develop and field test various large-scale mechanical treatment tools. These tools, one of which is an amphibious tracked vehicle called a Marsh Master, are used to crush the tall *Spartina* stems, breaking them off at the base, and compact the sediment to restrict oxygen flow to the roots. Preliminary monitoring data shows a significant reduction in stem density and seed production following the crushing treatment. Additional efficacy data will be collected in the spring.

The herbicide Rodeo, which is the aquatic formulation of Roundup, is also used in conjunction with mechanical treatment methods. To reduce the amount of herbicide used, DNR's protocol is to first mow or crush the *Spartina,* and then apply herbicide to the shorter, less dense plants. As a result, more of the plant's surface area is covered by the herbicide. This approach is more effective, and requires less herbicide as there is less plant biomass to treat. Federal and state permits are required before applying the herbicide, and water quality aspects are regulated by the Washington Department of Ecology.

In addition to the aforementioned treatment methods, DNR is also collaborating with the University of Washington to implement and study the effects of a biological control program. To date, the biological control agent, *Prokelisia marginata,* has been released in three sites in Willapa Bay. This insect has been shown to be highly host-specific to invasive *Spartina* species.

DNR manages 46,000 acres of aquatic lands in Willapa Bay. In 1999, DNR -- in partnership with U.S. Fish and Wildlife Service and Washington Department of Fish and Wildlife --, treated approximately 600 solid acres of *Spartina* in the Bay. In 2000, partners treated approximately 800 solid acres.

5. Noxious Weed Control on State-Owned Agricultural, Grazing and Range Lands

DNR manages 1.1 million acres of agriculture, grazing and range land (which includes 420,000 acres of forest land used secondarily for grazing) on behalf of numerous trust beneficiaries. Some of this land is in intensive, irrigated agriculture; the rest varies from dry land agriculture to range land used for cattle grazing.

As a landowner, DNR is required to follow RCW 17.10, which holds that landowners – including counties and state agencies – are responsible for controlling weeds on their property. DNR does not control weeds on agricultural lands it leases to independent farmers and orchardists; instead, lessees are contractually responsible for noxious weed control. DNR lessees are encouraged to follow IPM principles in their weed treatments.

All new DNR leases and permits have an attachment called a Resource Management Plan (RMP). Each RMP contains a mandatory Weed Management section, which specifies the requirement that "the lessee shall use Integrated Pest Management to control weeds." The clause then quotes the meaning and elements from the statute.

DNR only uses herbicides to control noxious weeds after determining that chemical treatment is the best way of meeting state noxious weed laws. Weed control by cultural, mechanical and biological control methods are always considered, and often used.

In all cases, the goal is to protect native ecosystems from the invasion of noxious weeds. Weeds are considered noxious when they are transported into a new ecosystem in which they have no natural enemies, thus allowing their proliferation and near-complete domination of that landscape.

DNR has been using biological controls on numerous sites and test plots. DNR has also been cooperating with county weed boards, US Forest Service, APHIS, Washington State University, and several lessees to start colonies of insects that attack certain noxious weeds. Over time, insect populations grow large enough so neighbors can share bugs and move them to other sites. Though this approach takes several years to show benefits, it is ecologically safe and sound and helps build a stable and balanced ecosystem.

In 2000, DNR controlled noxious weeds on 4000 acres of agricultural, grazing and range lands. Of that, the department treated fewer than 1000 acres with herbicides. Most herbicide applications are made to roadsides, where weeds tend to thrive and in remote areas where chemicals can be safely applied. Where herbicide use is deemed appropriate, it is applied in very small amounts (the active ingredient amounts to a cup of some material being spread evenly over a football field). Knapweed, yellowstar thistle, rush skeletonweed, leafy spurge, salt cedar, dalmation toadflax, and thistles are all controlled in this way.

6. Management of Vegetation Along State Forest Roads

As part of its forestland management and fire protection duties, DNR manages 14,000 miles of logging roads. The management of these roads requires that roads be kept passable and safe. DNR manages 5-to-15 foot wide strips along both sides of its roads to maintain acceptable levels of

visibility. Since safety has very little tolerance for error, the buffer strips must be kept free of vegetation that does or soon will obstruct vision.

Vegetation with stem diameters of two-to-five inches is controlled with mechanical brush cutting equipment. Stems and trunks in excess of five inches in diameter require hand- and chain-saw cutting. Herbicides are only used on roadsides with vegetation stems no more than three inches in diameter.

DNR controls vegetation on approximately 1500 miles of road a year. 35% of those miles are controlled by chemical means, 60% by mechanical brushers, and 5% by hand methods.

7. Controlling Forest Insect Infestations

DNR provides technical assistance to state and private forest landowners to help reduce or prevent significant forest losses caused by insects, disease, animals and similar threats. Thousands of forest landowners and managers are educated each year in the basics of forest insect and disease recognition and management. Monitoring, evaluation, and careful implementation of forest pest suppression strategies are key to this effort.

DNR's integrated approach to pest control generally reduces the need for chemical suppression of insects and diseases. Nevertheless, during 2000 and 2001, chemical suppression was required to treat western spruce budworm and Douglas-fir tussock moth in eastern Washington and Douglas fir Swiss needle cast foliage disease in western Washington.

Monitoring techniques include a comprehensive annual aerial survey and a variety of special surveys, such as insect trapping and on-ground evaluations. DNR and the US Forest Service conduct an annual aerial survey to detect forest damage and to promptly alert landowners to insect and disease activity. Approximately 17 million acres are evaluated each year. Damage area maps are distributed each winter to major forest landowners and county agents. Recommendations to reduce the impact and extent of specific problems are available.

Special pheromone trapping surveys for defoliating caterpillars provide early warning of sites where intolerable damage is expected to occur. In 2000, 3627 acres of state land was sprayed with B.t.k. (*Bacillus thuringiensis var. kurstaki*) to protect foliage from western spruce budworm in the Glenwood vicinity (Yakima County). Approximately 300,000 acres in Washington continue to be impacted. More than 100,000 acres of private and tribal lands were sprayed with B.t.k. in 2000 and 2001 to suppress this insect. Spraying B.t.k. costs about $30 per acre.

An aggressive timber management program to reduce the susceptibility of forests to western spruce budworm and other hazards is currently being implemented on state forestland in Klickitat and Yakima counties. Management issues are complex and options may be limited in affected areas as the same forest structures that are highly susceptible to western spruce budworm damage also provide good habitat for the endangered northern spotted owl.

The Douglas fir tussock moth (DFTM) periodically causes severe defoliation of Douglas fir and grand fir in eastern Washington. Based on early warning of imminent outbreaks, affected areas in the Blue Mountains (3912 acres of federal land) and Methow Valley in Okanogan County (approximately 18,000 acres of federal, state and private land) were treated with a virus to suppress

caterpillar populations in 2000 and 2001, respectively. This highly targeted virus only kills exposed caterpillars in one family of moths. It successfully reduced DFTM in treated areas. Additional areas of DFTM activity in Asotin, Whitman, and Spokane Counties are being intensively monitored and the potential need for control in 2002 is being evaluated. Federal tests of a mating-disruption system for suppressing DFTM are being supported with plot sites in Washington.

The Douglas fir beetle has been killing mature Douglas fir trees in northeastern Washington for several years. Populations initially rose following the winter storms of 1996-97. Insects are now taking advantage of trees weakened by drought, disease and over-crowding. DNR's Forest Health Program has implemented a special aerial survey for trees killed by the Douglas fir beetle. State lands timber sales staff also remove dead and at-risk trees whenever possible. Anti-aggregation pheromones are being used on several federal and private sites to reduce Douglas fir beetle damage.

Swiss needle cast is a native foliage disease of coastal Douglas fir that has been at particularly high levels the last five or six years. Excessive damage and mortality have been observed in coastal Oregon, resulting in a tremendous need for information regarding the extent, impacts, and reasonable management of the disease in Washington. Special aerial and ground surveys have been performed by DNR and resulting maps distributed. Additional work on needle retention rates and a study of foliage protection with foliar fungicides has been implemented. Approximately 2 acres were treated with Daconil® and 0.25 acres were treated with Crossbow® in 2000, and again in 2001, as part of this research.

IPM and pest prevention strategies are a natural for forestry. Forest managers cannot afford pest problems when current log prices are so low and investment returns occur over such a long term. Managers must employ prevention strategies to maintain vigorous trees able to defend themselves and/or recover from insects or diseases. Constant monitoring, scientific evaluations of specific situations, and focused suppression tactics (when necessary) are the keys to a forest health IPM strategy in Washington.

Washington State Department of Transportation

Integrated Pest Management on the Roadside

Introduction

The Washington State Department of Transportation (WSDOT) uses Integrated Pest Management (IPM) principles to manage roadside vegetation. "Pest" vegetation is measured through the Maintenance Accountability Process (MAP) as noxious weeds, nuisance vegetation, or vegetation obstructions. Service levels targets or thresholds for the control of pest vegetation are set by the legislature as part of the transportation budget.

Implementation Process

Washington State Department of Transportation (WSDOT) completed an Environmental Impact Statement (EIS) on its roadside vegetation management program in 1993, using State Environmental Policy Act (SEPA) guidelines. Through this process WSDOT received extensive public comment, and selected a preferred alternative recommending the use of Integrated Pest Management (IPM) principles and preventative vegetative strategies as a basis for roadside vegetation management planning and practice.

In 1995, WSDOT received a grant from the US Environmental Protection Agency to develop guidelines for implementation of an IPM program. WSDOT hired the Bio-Integral Resource Center (BIRC) to write a document containing definitions, methodology, and guidelines for the use of IPM in roadside vegetation management. This document, entitled Integrated Vegetation Management for Roadsides, was completed in July of 1997. Integrated Vegetation Management (IVM) is synonymous with IPM, but includes additional considerations relating to the care and management of beneficial plants.

Long-Term Implementation Strategy

To successfully implement an IPM approach in roadside management, WSDOT is working to coordinate roadside planning, design, construction, and maintenance activities. The agency policy and guidelines can be found in the Roadside Classification Plan (WSDOT 1996), which provides regional and route-specific recommendations for roadside restoration and management. One of the primary objectives in this approach is prevention of roadside pest problems through coordinated management decisions and the establishment of stable, beneficial roadside plant communities. The ultimate goal is to design and construct roadsides with beneficial native or naturalized plant material that will require the least amount of maintenance over time.

If preventative roadside treatments are applied through project development and partnership opportunities over time, roadside management demands on maintenance will gradually decrease and allow increased use of IPM principles within the annual activities of the roadside maintenance program. To study the benefits and costs of applied IPM within the existing maintenance program, WSDOT is in the process of documenting IPM applications through maintenance in four separate case studies. These projects are currently in the third year of a coordinated five-year research project. Benefit cost information and treatment results generated through this research will be used

as a basis for future program planning and policy development to expand IPM applications in roadside maintenance throughout the state.

Current Practice

Management of the state's 7,000-mile highway system is decentralized in 24 individual maintenance areas within 6 regional offices around the state. Within this organizational structure, planning and execution of highway maintenance activities vary slightly depending on the needs and resources of the local area. By definition in RCW 17.15, WSDOT practices IPM in varying degrees throughout the state. The key element in WSDOT's practice of IPM is prevention. With current funding levels, prevention of pest vegetation and minimization of maintenance requirements is being accomplished as follows:

Preventing Pest Problems through Maintenance - For seasonal management of noxious and nuisance weeds, maintenance uses state of the art technology and highly trained operators to achieve control prior to seed set to prevent expansion of existing populations through seed germination the following year. Higher priority is given to controlling pioneer weed infestations and control is coordinated with the county noxious weed control boards. When budgets allow, maintenance invests in activities to promote the health of existing beneficial vegetation and in seeding and/or planting of desirable species.

Preventing Pest Problems through Design and Construction - Roadside restoration in accordance with the RCP is required as part of all construction projects with roadside Impact. Where this occurs and the roadside is successfully restored through design and construction, maintenance requirements for control of pest vegetation are minimized. Also, roadside restoration plantings are accomplished through partnerships with local communities as part of the Adopt-a-Highway Program.

Challenges to Implementation

There are a number of challenges to implementing IPM within WSDOT:

Maintenance Funding - Current service level targets set by the legislature and defined in the MAP are C+ for noxious weed control, C- for nuisance weed control, and D for control of vegetative obstructions. With funding at these levels roadside vegetation management activities are only able to react to the most critical vegetation management needs. Prevention activities are limited.

Construction Funding - Project funding is currently in short supply and the priority for WSDOT Program Management is congestion relief. Dollars spent on roadside restoration add to individual project cost and have an overall impact on project delivery. However, the RCP requirements along with the requirements of environmental permits and Endangered Species Act compliance are all working together to raise the priority for roadside restoration within the overall scope of highway design and construction.

Decentralized Organizational Structure - Because of the size and geographic distribution of WSDOT, many decisions must be made at the local or regional level. It is difficult to institute an agency wide system for uniform decision- making, such as IPM, within this context. To do so would require commitment of resources for development and implementation of an agency-wide record keeping system for monitoring and evaluation.

Given these challenges, WSDOT Is proceeding with the development and implementation of IPM for roadside vegetation management. Successes have come from the applications of new technology, training and employee development, and creation of maintenance information systems for use by roadside managers in the field.

Cost Comparison

Benefit/cost analysis is an essential consideration In the Implementation of IPM. However, with vegetation management it takes a number annual growth cycles before measurable trends begin to develop. WSDOT is currently studying this Issue in two ways:

Maintenance Area Case Studies - As mentioned above, a series of four case studies are being conducted in varied setting throughout the state. The first phase of benefit/cost findings from this research will be compiled and published two years from now.

Development of a Roadside Benefit Cost Projection System - The WSDOT offices of Design, Maintenance and Environmental Affairs are currently working together on the development of system to measure and project economic, efficiency and environmental benefit/cost resulting from roadside management. The first generation of this system is expected the winter of 2002 - 2003.

References

Maintenance Accountability Process http://www.wsdot.wa.gov/fossc/maint/mgmt/map.htm
Roadside Classification Plan
http://www.wsdot.wa.gov/EESC/CAE/design/Roadside/Rcp.htm
Integrated Vegetation Management for Roadsides
http://www.wsdot.wa.gov/fossc/maint/roadside/ivm.pdf

Washington State Noxious Weed Control Board

Under Washington State's noxious weed law (Chapter 17.10 RCW), landowners are responsible for controlling certain noxious weeds on their property. The law mandates a result, not a control method. While the Washington State Noxious Weed Control Board (Board) cannot mandate a specific control strategy for landowners, the Board does believe Integrated Pest Management is the preferred alternative for managing noxious weed infestations. Therefore, the state's weed program is centered on an IPM philosophy.

The Board places a strong emphasis on the prevention of noxious weed infestations. This emphasis is reflected in the state noxious weed list, which the Board adopts by rule each year. The Board systematically classifies noxious weeds based on the stage of invasion of each species. The classification system is designed to prevent small infestations from ever becoming large infestations, and to contain already established infestations, thus preventing their movement to uninfested areas of Washington.

Noxious weed education is another important part of the Board's prevention strategy. The Board employs an education specialist who educates the public on noxious weeds and how to avoid introducing and transporting them. Board staff also provides training to county noxious weed control boards, weed districts, and agency staff on plant identification. If new species can be identified promptly, their spread can be prevented. To prevent the continued introduction of noxious weeds through the sale of ornamentals, the Board works with the Washington State Department of Agriculture to develop quarantines that prohibit the continued sale of known noxious species.

In addition, the Board emphasizes early detection of new infestations. Board staff works with county weed boards, weed districts, other agencies, and the general public to provide assistance with weed identification. The Board also assists local weed programs in the use of new technologies (e.g. GPS/GIS) for tracking infestations. In counties without weed boards, the Board conducts noxious weed surveys. This survey and monitoring information is used each year to update the state weed list.

Through the state noxious weed list, the Board sets action thresholds for noxious weed control statewide. This prioritized list includes three different classifications. Class A noxious weeds are of very limited distribution and are targeted for eradication. No level of infestation of these species is acceptable. Class B weeds are of limited distribution in some parts of the state and are widely distributed in other parts of the state. In areas of limited distribution, state law requires control (prevention of seed production). Where Class B weeds are widely distributed, local weed programs have the option of setting the damage and action thresholds that are appropriate in their areas. Class C weeds are abundant and widely distributed throughout the state. Again, local programs set their own priorities with these species.

Since the Board does not manage any land, it does not directly control noxious weeds. However, the Board provides information on physical, mechanical, cultural, biological, and chemical control

methods to interested parties. Staff tries to emphasize the importance of an integrated approach, so landowners can treat the cause of a noxious weed problem rather than just the symptom.

The Board recognizes that information gathering is a continuous process. As more information becomes available on noxious weed biology and control, the Board strives to share this knowledge with others and to use it in decision-making.

University of Washington

Update of Implementation Process

The University of Washington's draft IPM policy was adapted from that under consideration at Western Washington University with our generous thanks to Tim Rinn for sharing the policy he developed. The draft policy has been submitted to the UW EHS Director for comment and is submitted along with this report. Revision will occur before it is presented to higher administrative levels for adoption; its principles have been in practice for many years, however.

Techniques

All five University of Washington subdivisions responsible for major pest control operations have continued using the IPM methods presented in detail in the previous 1999 report; little has changed. These sections are: Grounds; Structural; Botany Greenhouse; Urban Horticulture Greenhouse, and Pack Forest.

Grounds

A compost tea brewer was purchased (~$5000) and experimental use begun. All roses were treated with it, but with mixed results; black spot was a problem, possibly because of spraying in the afternoon, which allowed water droplets to linger on leaves. No fungicides were used at all on roses this year, and the tea experiment will be continued next year to see whether current results are the norm. Also, more susceptible roses will be removed and replaced by less-susceptible varieties and ages.

In response to the appearance of Dutch elm disease in Olympia and Bellevue, a new preventive technique was begun in addition to the practice of tree sanitation, which has been standard for many years. Two new chemicals were tried on susceptible elms: Arbotect and Dutch Trig. For the former, trees received multiple injections of a fungus-preventing chemical, which, if effective, will prevent DED fungus from successfully infecting the trees. It must be re-applied every three years. Dutch Trig functions as a vaccine which immunizes trees to the fungus but is costly and must be applied annually. If these work, they would prevent successful infection and the consequent destruction of many very large elms, but about 1% of exposed elms may still develop the disease despite treatment. This is a good IPM practice because the chemicals are totally confined to the trees and non-toxic to non-target organisms.

An ingredient in the fungicide Confront, clorpyralid, has been found extremely durable and does not break down. It has killed plants secondarily after compost made of manure from cows which had grazed Confront-treated hay was used on tomato beds. This is a good argument for an IPM policy which uses non-chemical methods before chemical controls.

Structural

The usual IPM techniques have been continued as in previous years. Baiting has entirely replaced spraying for all pests except vespids. Snap traps continue to be required for intra-building use, while baiting is used outdoors to minimize danger to non-target species. Several years ago, one large building with non-opening windows had a severe recurrent cluster fly infestation. Scaffolding was erected and as many cracks to the outside as could be detected were sealed, greatly reducing the problem.

Botany Greenhouse

Non-chemical techniques continue to be preferred and include:

- Environmental manipulation – Adjusting temperature, humidity, air flow, light level, etc., to push the balance point in the desired direction. This often works better than pesticides to control a pest.
- Water sprays – To wash off fungal spores, insects, or mites.
- Trapping – Sticky cards throughout the greenhouse allow trapping for monitoring and pest reduction.
- Importation of exotic pests is resisted by careful inspection of incoming plants.
- Biological organisms – purchase and release of living organisms to manage imported insect and mite populations as well as foster native populations of beneficials. Understanding their life cycles and environmental preferences helps to manage them as part of this integrated approach.

Aphid: Several species are typically encountered. Strong jets of water to dislodge the pests are employed rather than predators or parasitoids, and by using "soft" pesticides, the native wasp species which parasitize aphids are encouraged to breed in the greenhouse. Occasional application of pesticides, such as pyrethrin, and fungal pathogens of Homopteran species are used.

Fungus gnat: Gnatrol, a *Bacillus thuringiensis israeliensis* formulation, is the most important pesticide for this. Installation of ebb/flow trays in the greenhouse last year dramatically reduced gnat populations because, by reducing run-off of water from bench tops to the soil floor, moist soil under the benches, a very likely site of gnat pupation, was much reduced.

Mealybug: Periodic purchase and release of the predator *Cryptolaemus* helps reduce high populations of this pest. Strong water jetting of stems and foliage is valuable in dislodging these insects. Pesticide application, particularly of horticultural oil and insect growth regulators, are also employed.

Scale: Control is based on water jetting and pesticide application.

Spider mite: Purchase and release of predator mites is used, as are water sprays and pesticides like the soil bacteria extract, Avid.

Thrips: Probably the most difficult greenhouse pest. Predators of this pest have not yet

been tried, as these will forage on pollen when thrips density is low, unacceptable due to the nature of many of the research projects in the greenhouse. Horticultural oil and selected other pesticides are employed as needed. Small amounts of sugar are routinely added to pesticide mixes to encourage thrips to emerge from hiding and feed on the spray droplets.

Whitefly: Control involves use of the parasitoid wasp, *Encarsia formosana*. These were purchased and released in the greenhouse several times over the last 15 years. By removing leaves from plants with large numbers of parasitized whitefly larvae and placing these near young plants with low densities of pest, whitefly populations are reduced. Application of pesticides compatible with the wasp are also used.

Additional problems might be caused by induction of resistance to pesticides by repeated application of one or two chemicals, countered by alternating pesticides with differing chemistry to avoid possible selection for resistance to a useful compound.

Center for Urban Horticulture

No changes since the last report.

Pack Forest

No changes since the last report.

Implementation Problems

The University is currently not experiencing any implementation problems. Administrators are very supportive of IPM practices, and the structural pest control contractor uses IPM practices as a normal business policy.

If institutions contract their structural pest control services out, it is recommended that they specify IPM practices in considerable detail in the contract specifications and select a vendor which already uses IPM as its standard pest control philosophy and technique.

Cost Comparison

No section has been able to provide cost comparisons because all have used IPM techniques for a long time. There has thus been no easily-defined transition from pre-IPM years to the present. However, Grounds' chemical costs have been much lower this year, partially due to IPM's surveillance aspect regarding weather as a determinant for the type of treatment. Grounds' costs were higher because of Dutch elm disease prevention treatments: $3080 to treat 10 elms with Arbotect as well as this treatment's high labor costs, and $3010 for 10 vials of Dutch Trig vaccine plus application.

Western Washington University

Update of the Implementation Process

Implementation of integrated pest management (IPM) at Western Washington University has been slow but steady during the past couple years. An important first step, for implementation, was to procure the dedicated use of a computer for the purposes of documentation and communication. This was realized last year and has been a helpful resource tool. A statement of intent was generated and circulated to management. This statement informs interested individuals of this institutions intent to use an IPM program to control pest problems. There were no comments or concerns expressed for or against this IPM statement of intent. A draft policy was written and formatted as per requirements accepted for policy writing. To date, our IPM policy has not been adopted, reviewed, revised or given attention.

Western Washington University staff performs all aspects of pest control both structural and landscape. Unlike other institutions, we do not contract out any of these services. This presents a unique opportunity to manage all aspects of an IPM program. For landscape management, implementation requirements such as onsite inspection to collect baseline data, site survey inventories and prioritization of building and landscape issues are slowly moving forward. Other implementation issues such as setting pest action thresholds, monitoring frequencies, pest prescriptions, objectives and expectation lie in the minds of the gardeners, but so far have not been documented for management to see. From the structural perspective, building surveys, action thresholds and monitoring frequencies, pest prescriptions, objectives and expectation have been documented. Some long-term solutions have been outlined for both landscape and structural pest management, as part of our 1999 legislative report. Yet very little in the way of actual building towards a comprehensive IPM program has been done since that time. To be fair, a significant amount of attention has been devoted to upgrading pesticide usage documentation. This has focused our attention on the use of these pesticides as to being such an overly relied upon tool.

IPM Techniques

Staff members have been somewhat proactive in the pursuit of alternative approaches to the same old problems. For the most part, fiscal support has been short in arriving. Landscape staff continues their emphasis on native vegetation, physical weed removal, mulching and composting. While structural staff continue to rely on traps and baits for both insect and rodent control. However, education is clearly the best IPM tool, especially when staff members are concerned about the circumstances of pest appearances and the expectations of results. The best example can be found in the food handling institutions. The use of pesticides in dining halls is a sensitive issue to resolve. The interplay of students, sensitivity and perceptions of pesticide use, timing and placement of application and the availability of consumables create logistical difficulties. Therefore we have put into practice a monthly floor level sanitation inspection. A form was developed and food service staff was educated on the expectations of the inspection. At the same time pheromone traps and baits, specific to targeted pests, were monitored and maintained. The level of sanitation in the dinning halls increased and the level of pest occurrences decreased with each month and each report. Suffice it to say a proactive, integrated approach to the problems of food service pest management has been effective. There have been no major pest infestations in food service for over eight years. The occasional rat, Indian meal moth, fruit fly or cockroach is met with appropriate

offensive measures. Indeed, the food service contractor has been pleased in addition to appearing progressive in the eyes of the parent company.

Once a lawn of less than 3500 square feet located between a brick wall and an ivy bed would have presented to us maintenance difficulties. This was an isolated hand mowing location. Additionally, the area was rated as a low priority on the site survey. The decision was made to seed the area with English daisies (*Bellis perennis)* which requires very little maintenance. At first, some staff of the adjacent building had a hard time giving up the mowed lawn for the field of flowers. The students, on the other hand, trampled the flowers in their attempt to pick as many of them as they could. Yet, they did no harm as these flowers continue to spread and bloom and bring an array of colors to an otherwise dull sea of green. The results have been minimum cost and maintenance for maximum beauty and diversity.

In a few of the smaller, high priority lawns simply caring a small tool for mechanically extracting plantain and dandelions is an effective management tool and cost effective. This practice avoids the exponential spread of the weeds by seed. The estimate of the time to spray this area would be at least 3 hours, including mixing, flagging, notification and documentation. In these same lawns, a good irrigation program and a mulching mower require only one application of fertilizer per year, in November. A fall time dolomite lime application seems to amplify the growth of clover, which contributes to the lush green look of these lawns during the summer months. To eliminate clover requires an extensive 2-4D program with three broadcast applications the first year and follow-up each year thereafter. The time for application, mixing, flagging, notification and documentation can now be used on other pest management issues. In addition, the reduction of chickweed, moss and *Runuculus* (buttercup) can be seen in these lawns where Dutch white clover is encouraged to grow. *Runuculus* is notoriously difficult to control with the use of chemicals but appears to be smothered out of lawns with clover.

Cost Comparisons

In the 1998 fiscal year we spent $388.98 for traps, baits, pheromone and growth regulators used in monitoring structural pests. Then again in 2000 we spent an additional $97 for more traps and rodent bait. Most of the purchases are still in use today and will be for the 2001-2002 year. Experience has shown us that this kind of monetary commitment is the norm not the exception for an IPM program. Landscape maintenance could not provide yearly cost comparisons for this report.

Implementation Problems

Therein lies the hurdle for the implementation of integrated pest management, fiscal and managerial commitment. To change from the “old school” thoughts of pest management to IPM, requires administrators to commit to change, not fight change. This change is a shift away from exclusive chemical control to a coordinated decision-making and action process employing biological, cultural and ecological management techniques. It is also a long-term management strategy, based on sound ecological and cost/benefit principles. IPM is not a new concept but education and public awareness must continue to inform those on the mechanisms of an integrated program.

The IPM coordinator is the voice of this change. Therefore, this coordinator needs the authority of position to interact professionally with all levels of the decision-making process. Architects, contractors, planners and designers must be aware of the IPM decision–making process as well as the administrators, managers, and the university community. Without a position of authority to

influence changes in these people, no IPM coordinator will be taken seriously. This is why the IPM coordinator must hold a management position. The authority must come from a comprehensive policy, adopted by the administration, at the university level. A university wide policy adopted and binding on all state and contract pest management operators is necessary for full implementation of the IPM program. Then the collective consciousness of the university community can be raised on issues pertaining to integrated pest management. This level of commitment and the authority of the IPM coordinator are two major hurdles in the way of implementing the program. Legislation alone does not guarantee implementation.

Fiscally the commitment must be made to upgrade to the tools necessary to run the program. Such things as flamers, specialized applicators and traps, brush mowers, a compost facility and tea brewers, along with growth retardants are some of the tools this program badly needs. Training and education is an ongoing event. We must continue to focus on new technology that can help us manage pest issues based on sound ecological and cost/benefit principles.

The State of Washington might create a new university grounds position, entitled "Outdoor Custodian". The purpose, of this position, is the collection and disposal of garbage and litter. This would provide the university Gardener II greater spatial focus with respect to IPM. Indeed, a full-time crew of Outdoor Custodians or perhaps even Gardener 1's supervised by respective Gardener 2's would help effect change towards this end.

Presently management believes that too much time is being spent on documentation, either for IPM or chemical application requirements. This speaks to the level of commitment and knowledge of management on IPM implementation. Documentation is an essential component of any IPM program. It provides history, identifying schools' problem areas and the tracking of what, where, when and how pests were controlled. Documentation is the only way to evaluate the effects and efficacy of pest treatments. It also provides the support necessary to convince those who provide a fiscal commitment. In addition, when it comes to the reporting of pesticide usage, it is the law. Management says this is a "hurdle" to full implementation. We say, rather that this is a "handle" on *full implementation.*

Integrated pest management will reach full implementation at this university when administrative personnel realize the long-term cost-effective benefits of integrated pest management. Actually these adaptive and integrated pest management practices minimize negative impacts to human health and natural services without compromising effective management of nuisance organisms. These practices conserve community and natural values and preserve drinking water quality by providing community-wide examples of safe and effective pest management practices. The university therefore becomes a role model to the community for practicing sound environmental management in a sensitive watershed.

Big Bend Community College

Update of Implementation Process

In addition to updating the implementation process I am also finalizing a formal I. P. M. policy to submit to the vice-president of the College for approval. Until now, I. P. M. procedures have been implemented as needed and as time permits by the grounds crew. Our structural pest control is contracted out, therefore I will be contacting them to see if they practice integrated pest management.

Integrated Pest Management looks at available options and chooses the best for handling a specific problem. This summer we had one person working specifically in our bed areas keeping them clear of weeds. This was a considerable help in allowing us to minimize the amount of chemicals used in these areas.

Implementing an I. P. M. program is slow and there always seems to be things outside the usual to deal with. This year it has been my health and ability to get out and do my job yet practice I. P. M. Our crew of two was cut in half during the spring operation time, a time, which was when we normally would spray lawns as needed for broadleaf weeds. I was recovering from surgery then so hardly any of the lawns got sprayed. This year we have seen what our acceptable thresholds were and then some.

Techniques Being Used

Our best technique so far is monitoring. We haven't applied any insecticides on this campus for years. We do have some insect problems but we also have predators consisting of ladybugs, lacewings, and praying mantises. The trees get pretty loaded with aphids every year, but we've lost more trees to lawn mower damage or poor planting procedures than to insects.

Almost everyone accepts that there are more weeds in the lawns than in the past, but most people would rather have that than the herbicides. Sometimes, it's hard for the grounds crew to adjust to this because we were taught to spray everything and that a lawn must be weed free. With a crew of two it's very difficult to complete the monitoring on any schedule but we do the best we can.

Whenever we do any new construction we think of IPM in figuring lawns, plants, soils, and how to take care of them with the equipment we have.

Implementation Problems Being Encountered

Our biggest problem would have to be lack of labor force. We have a two-man grounds crew that consists of a Gardener Lead and a Sprinkler Maintenance Worker. We are both very well aware of I. P. M. but our responsibilities are many and our numbers are small. We both attend pesticide re-certification classes, seminars, and other meetings pertaining to weed control. Most of those meetings don't deal with integrated pest management but they do discuss new products, old products, or whatever and to basically spray, spray, spray everything. For the most part, I got my I. P. M. education while attending college and a little at re-certification classes, but currently as an I. P. M. coordinator. We seem to be only a few in a field of thousands and it's tough to get the word out there.

Cost Comparison

We used to spray all the lawns, spring and fall, which would cost around $2000.00 per application. Spraying as needed in the spring and only spot spraying as needed in the fall has cut that expenditure to about half.

Clark College

INTEGRATED PEST MANAGEMENT

To define ”Integrated Pest Management” IPM, we need to look at and define all three of its root words. The definitions are as follows:

> Integrate - to make whole by bringing all parts together.
>
> Pest – an undesirable organism (insect, fungus, nematode, weed, virus, or rodent) that is injurious to humans, desirable plants, animals, manufactured products or natural products.
>
> Management – the act, manner, or practice of managing, supervising, or controlling.

It becomes clear by looking at these definitions, we are going to control undesirable organisms by the bringing together of all parts and by orchestrating or managing these parts.

What are these parts that we are going to manage? They would seem to be different methods or types of controls. If we assume this is true, we can now define IPM in its entirety as controlling undesirable organisms by using the method or methods deemed appropriate from all available options. The change comes with a new consciousness or awareness as well as with the new technology that we can include in our list of options.

Integrated Pest Management does not then imply, as is sometimes believed, a ban on chemical control. It does rather suggest that pest managers consider all options. Some of the broader categories to be considered are:

Cultural Control – creation of environmental conditions unfavorable to pest development i.e., keeping plants fertilized and watered; crop rotation; selection of resistant strains; using properly established plants; avoiding the planting of exotics that have special requirements or limitations; and mulching.

Mechanical Control – cultivation, pruning, cutting, tilling, raking, hoeing, etc.

Biological Control – control using predators or disease causing organisms. Control by the use of natural enemies that may be naturally occurring or introduced.

Chemical Control - the use of artificial chemicals to control pests.

It quickly becomes quite evident that the management choices are virtually limitless. We need to gain an understanding of just what it is that causes us to initiate action or apply a method or methods of control against a pest. How bad does a situation have to become before we take action? In order to answer these kinds of questions, we need to establish thresholds. These are limits that need to be exceeded before we apply a control method. We may see a larger number of insects on a plant and decide not take action because we have determined that they are not harmful to that plant. On the other hand, we might find a small population of insects that are causing defoliation problems

in a highly visible location and decide to take action immediately. In this instance, we can say that our threshold was exceeded.

It appears that in dealing with IPM that there are several categories of thresholds that are established through the use of different criteria. If a homeowner sees an insect on his prize rose bush and employs some method to kill it even though there was no damage, we might say that he is reacting to a personal tolerance threshold, which in this case is extremely low. If this homeowner didn't react until that insect started eating the leaves, we might say that he was reacting to an esthetic threshold because that insect was making the plant unsightly. If this same homeowner didn't react to the insect until it began eating the flowers that he wanted to sell at the market, then we can say that he reacted to an economic threshold. It doesn't mater whether we set thresholds or someone establishes them for us, it is very plain that it is these thresholds that drive the program or promote the action.

The real consciousness or awareness would indicate that we need to manage for the common good. We need to change our operative thinking by educating our employees and ourselves. It is this rational knowledge that ultimately will find its way to the public sector. We need to show concern on the issue of pest management and be responsive to positive changes in technology. It isn't necessary to choose sides or take an anti-business position but we might feel some responsibility to influence the direction of business and technology.

There is a transitional process that we can subscribe to that immediately give us a proactive IPM image, solve several related problems, and forces us to begin our educational process. We need to personally and physically take a long hard look at our pesticide storage areas and inventory them regularly. We need to systematically and consciously attempt to reduce this inventory by using up existing stocks, disposing of undesirable materials, and not reordering in large hold over quantities. This reduces storage areas in size, reduces our stocks to manageable quantities, forces us to become familiar with the products we have, may uncover some options, and provides us with knowledge of some new technologies.

We need to continue the image enhancement of our departs and individual staff members through education, positive public relations, and by working against all of the negative stereotypes. Too often people in the landscape industry are negatively labeled by a less than informed public so it then becomes our place to make this same public aware of their misconceptions. We find people being very vocal about a responsible herbicide application who turn around and use an aerosol bomb type insecticide treatment on a closed type interior environment.

The education of your staff is key to the IPM process. Employees need to be able to recognize problems and suggest some options. They need to understand the rationale to our decision-making processes. Employees also need to be made aware of what the departmental goals are relative to IPM if not instrumental in their need to keep accurate records of pest problems relative to time and record our reactions to these problems. Finally, we need to monitor and evaluate trends and results. These are things we cannot accomplish without ongoing education and an increased sense of awareness.

Through constant monitoring and reevaluation, we automatically begin to modify pest management programs. Blanket or prophylactic applications of non-target specific, highly residual chemicals no longer make sense. The killing of large populations of beneficial insects is now known, for

example, to necessitate increase control measures due to imposed imbalances between pests and their natural enemies. It is said that less than 5% of all insects exist as pests. This further points out the need to use target specific control methods.

As pest managers, we know that our primary responsibility is to keep potential targets of pest activities naturally healthy. Whether these targets are plants or animals, we know that the healthier they are the less likely they are to be attacked by pests. We need to accept the responsibility of providing adequate basic requirements (i.e.. food and water) and suitable physical surroundings, which allow these potential targets to resist pest attacks. We need to subscribe to the technology that has provided us with lists of genetically resistant species.

As operative tactics shift toward total bio rationality, business and industry will be forced to bring new and affordable pest control products to the market place. This will further shift the balance toward increased environmental awareness and responsibility. It will no longer be acceptable for pest managers to set IPM aside because of the reasoning that IPM is not operationally feasible or cost effective. Those most resistant to change will be forced to do so due to increased governmental regulations and restrictions.

Procedures for Interior Work Spaces

A. Employee and Student Responsibility

1. Except in designated food preparation and eating areas, it is necessary to permanently eliminate any sources of food and water in your area.

    a. Don't eat except in designated areas (i.e., not at your desk).
    b. Don't throw food material or waste in your trashcan.
    c. Don't store food in your work area.
    d. Liquid spills and leaks must be dealt with as soon as possible to eliminate sources of food and water.

2. Keep exterior windows and doors closed at all times. Buildings are intended to be closed environments. Airborne pests (whether winged insects or noxious fumes), crawling insects, mice, rats, etc., enter areas from the outside. It is necessary to prevent that entry.

3. If a problem persists at a level exceeding threshold tolerances, Plant Services should be notified. No pesticides of any kind are to be brought on campus or used by employees.

B. Plant Service Responsibility

1. All complaints should be responded to in a timely manner. A representative should survey the situation, check to see if employees are fulfilling their responsibilities, and make suggestions on how they can help alleviate the problem.

2. The representative will initiate a plan or series of events intended to eliminate the problem.

3. If all else fails, Plant Services will contract with a licensed exterminator to act on the problem.

Community Colleges of Spokane

SECTION 1: Update of Implementation Process

The Integrated Pest Management (IPM) policy was developed and approved in July 2001 for all Community Colleges of Spokane (CCS) locations. This process required the review and advice of the chancellor/CEO's direct report staff, review and approval of the CCS District Council (a district-wide representative body) and discussion at a CCS Board of Trustees meeting.

The IPM Program Implementation plan was subsequently prepared and distributed to key players at Spokane Community College (SCC) and Spokane Falls Community College (SFCC). The CCS IPM Coordinator selected is the district facilities operations manager. The IPM Coordinator prepared site survey forms for on-campus and off-campus locations. Site surveys were completed in September 2001.

SECTION 2: Techniques Being Used

A. Spokane Community College (includes off-campus sites supported by SCC)

(1) Turf: Weeds and disease: spraying with broadleaf herbicide, mowing to keep weeds from flowering and efficient water management.
(2) Shrubs: Weeds are controlled by a combination of mulch, mechanical methods and chemical applications.
(3) Trees: Pruning dead limbs, removing dead trees, leaving natural predators, using dormant spray, and planting trees suitable to the environment.
(4) Facilities: Problems with birds roosting on beams in open overhang roof areas. Sealed off all ledges with boards. Wasps have been a problem this year. We used traps and sprayed. We gained tolerable control, but will improve control next year by putting traps out earlier.

B. Spokane Falls Community College (includes off-campus sites supported by SFCC)

(1) Turf: Weeds and disease: pre-emergents, slow release fertilizers and efficient water management. Campus turf is 90% pest free.
(2) Shrubs: We are allowing our pest ridden shrubs that are near the end of their life cycle to die, and we are replacing with shrubs that are more pest resistant.
(3) Trees: effective pruning means insect control, opens up areas for lawn to get sun and allow for better airflow and a stronger limb system.
(4) Facilities: problems with nesting birds. Used foam seal to fill spaces in eaves.

SECTION 3: Implementation Problems Being Encountered

At both Spokane Community College and Spokane Falls Community College our grounds staff is exceedingly small. Spokane Community College is on 108 acres, nearly all of which is finished landscaping, including athletic fields. Spokane Falls Community College is on 123 acres, nearly all of which is finished landscaping, including athletic fields. Each campus is staffed with only one Gardener II and one Sprinkler Maintenance Worker. We simply do not have the resources to address pest issues for each plant species. Consequently, we have had to address issues more broadly; i.e. grass areas (landscaping and athletic fields), trees (deciduous and evergreen), shrubs

(deciduous and evergreen), and facilities (food service, child care, office/classroom). We will only be able to accomplish a site survey on an annual basis. Without budget increases to allow for additional grounds staff, we will remain at this level. The exercise of IPM, however, is valuable to us in raising our awareness about effective, non-chemical means of controlling pests, and making our environment safer for humans and animals.

SECTION 4: Cost Comparisons

Since this is our first year to track costs, we will not have a cost comparison until 2002. We know that we have saved money simply by cutting our irrigation schedule by 30 to 40%. Whether or not we have a savings by using mechanical means for weed control is difficult to determine, since we have had mixed results in some areas. We believe that we will have better information for 2002 since we have documented the cost of our control products. The level of effectiveness of control has determined the increase or decrease in labor. These numbers will be reflected next year.

Edmonds Community College

Edmonds Community College grounds staff manages our 50-acre campus, Horticulture Greenhouse and Horticulture Landlab, where our goal is to provide a pleasurable experience for visitors, staff, and students. The Grounds Staff takes great pride in creating a beautiful and colorful environment throughout our entire campus setting. The emphasis of our program has been to reduce or eliminate chemical exposure to humans, reduce the number and quantities of chemicals used, induce cultural, biological and mechanical controls, and educating our students and college employees concerning expectable thresholds and IPM methods.

Section One – Update of Implementation Process

The IPM policy has been submitted to the facilities staff as a draft copy. They will be given a chance for input and changes. This will be submitted to the Presidents cabinet and then to the board for ratification in winter quarter of 2002. A copy of this policy will be submitted to Kyle Murphy, WSDA IPM Coordinator. Although the policy is not formalized, the grounds Dept. at Edmonds Community College has fully accepted the IPM approach, have had extensive IPM training through extension classes at Washington State University and have been implementing this procedure in their day to day activities for the past few years. The depth of implementation has been an action needed basis and not a proactive program. We have not had the time, manpower, or funding to fully develop and implement the entire program, which we hope will come when the program is officially accepted. Currently if a problem is brought to our attention by gardeners, college staff, horticulture classes or instructors, then we tackle that problem using IPM strategies. During Installation of new landscapes and renovation projects, we thoughtfully consider IPM methods for plant selections, soil and site preparations outside our building structures.

Section Two- Techniques Being Used

Our cropping in the Greenhouse consists of two distinctly different types of plants.

1. Plants for Research and Development. Category I
2. Plants for Sale, or Campus. Category II

Our Economic Threshold Level is quit different depending on which category of plant we are considering. As we are primarily educational in nature we can allow populations of insects to develop or specific diseases to flourish as examples for our student population. These plants are generally rouged after their usefulness has ended. Monitoring and record keeping for these plants, (Category I Plants) is handles as Student Projects. Changes to this process will include duplicate records to remain in the Greenhouse Master Files. Category II Plants are subject to a much higher Economic Threshold Level. These plants are monitored weekly. Yellow sticky cards are used. Every effort is made to grow these plants in as healthy a manner as possible implementing every cultural, mechanical, biological and chemical means necessary to produce quality plants for sale and campus use.

The main campus has a healthy population of ladybugs, wasps, and lacewings for controlling our aphid populations with spot spraying of dormant oils and water flushing of problem plants. Monitoring this fall has indicated continued population growth of the predators. Our trees were covered with ladybug larvae. Expanding our release program to include lacewings, predator wasps as well as ladybugs have enables us to avoid any insecticides applied to the campus in the last five

years. The Grounds Dept. is very encouraged by the control achieved through the use of biological controls.

We are renovating our beds through mulching, drip irrigation techniques and plant selections to develop healthy plants resistant to pests. By careful selection of resistant varieties and new hybrids and by avoiding the plants most susceptible to insects and diseases we can plant landscapes that require a minimum of care. By utilizing the key resistant plants we save time and money.

We utilize pruning and sanitation as a mechanical means to control plant. By eliminating the inoculums that might otherwise infect neighboring plants we achieve a great deal of control. Another example of successful mechanical control is by pruning out nest and disposing of them we have eliminated the worst threat from tent caterpillar on campus.

Our weed control program consists of mechanical measures, groundcover selection and mulching prescription and chemical applications. Our staff mechanically controls the weeds in sensitive areas as much as we can and still maintain control. This would include all the beds, walks and lawn areas in central campus. Chemical control is restricted to the noninvasive herbicides and applied mostly on outlying areas.

We have controlled our rat/pigeon problems through monitoring, investigating runs and nesting areas, trapping/baiting programs, exclusion and cleanliness techniques, and renovation of our outside beds and pruning of trees and shrubbery touching our buildings.

Section Three- Implementation Problems Being Encountered

The administration is very supportive of our IPM program and does an adequate job for financial budgeting for supplies and materials at our present level of commitment. Our biggest problem is adequate staff to handle an IPM program. We have knowledgeable staff, but no time available to be proactive and do the IPM assessment of our campus, identify problems, develop IPM prescriptions, monitor, keep accurate records, or do IPM prescription evaluation. Our current staffing only allows for reaction processes and quick fixes for the short term, and not necessarily for the long term. This is not a true IPM program, but one that we have to live with considering our staffing restraints. We plan to devote additional time next year as one of our major goals for implementation.

Section Four – Cost Comparison

Since we have started IPM management our fiscal impact for our outside contractor budget has decreased. We had an outside contractor handle our building pests for our cafeteria, who was charging monthly fees. I found out that they were not following IPM methods and were spraying and baiting on a monthly basis without monitoring or evidence of an actual pest present. We discontinued that contract and started doing our own monitoring, accessing, and IPM controls. We found out that we were getting a better handle on our pest problem, better relations with our staff and students, as well as saving funds, which we could redirect for other IPM prescriptions and a reduction of chemicals and indiscriminate spraying. Until we have the staff to dedicate more time for record keeping, assessment, physical follow up and procedure changes, it is very difficult to do an accurate cost comparison. Our entire staff and the college unanimously all agree that the IPM approach is the best for the long term investment of our resources with more options and better tools to manage our problems, but we are still at a disadvantage until we have the staff or the dedicated time to implement.

Everett Community College

IPM full implementation will occur only when full site survey has been conducted and thresholds are set with provisions for changing conditions.

IPM Policy will only be set by the Board of Trustees and full involvement of the Administration and various committees already established.

At the operational level, IPM procedures are followed as closely as possible with temporary levels set and rough monitoring due to construction requirements and the loss of experienced personnel. During the last rat infestation, after inspection and location of entry points, exclusion methods were used in the approach and run area to remove population from the campus.

At present costs and historical fiscal tracking are not readily available, but should be after full implementation.

Grays Harbor Community College

Update of Implementation Process

Grays Harbor College implements a basic IPM program through monitoring and judgment. We have not compiled a handbook, due to staff and time restraints. This will be done in the future, as time and labor permits.

Techniques Being Used

The IPM program involves three different departments at Grays Harbor College: Grounds Maintenance, Facilities Maintenance and the custodial staff. The Grounds Maintenance department consists of 1 full time and 2 part-time gardeners. The Facilities Maintenance Supervisor oversees the Grounds and Maintenance staff. The Custodians work in relation to the prior departments to perform structural pest management.

The Lead Gardener is currently the only licensed pesticide applicator on campus with endorsements in Ornamental weed, insect and disease control. Therefore, the Grounds department is responsible for landscape, natural areas and occasionally the athletic field.

At this time, if insects are detected in buildings, a zero tolerance level has been established. The Custodial staff will mechanically remove the problem with vacuums, but if the problem persists, a local pest management is called to exterminate. If rodents are detected in buildings, a zero tolerance level has also been established and traps are used. The custodial staff will usually set the traps after the majority of staff and students are gone for the evening. The facilities maintenance staff will check traps and remove if necessary.

For outside pests, the Grounds Department is responsible for monitoring and implementing the management.

Implementation Problems Being Encountered

Problems we encounter with implementing specific prescriptions begin with the lack of staff and hours available. The main campus is our priority focus, which consists of 125 acres. Three satellite campuses we are also responsible for are located throughout G.H. County.

The Grounds department is still in the process of acquiring the proper equipment to help us mechanically implement prescriptions vs. labor-intensive physical processes.

Our focuses are high visibility areas, unless an activity is scheduled in a lower priority area.

Cost Comparison

Our cost comparison would reflect an increase in mechanical equipment. Grounds maintenance practices in the past were labor intensive. Areas were prioritized differently than our current practices. We have opted to purchase equipment to help with our practices. If equipment is not available, we weigh time and labor constraints and act from there. We usually opt to maintain pest problems mechanically, but occasionally we may need to do it physically or chemically. Each

situation has to be weighed individually. Labor must be scheduled as productively as possible as we have so much territory vs. hours.

North Seattle Community College

UPDATE OF IMPLEMENTATION PROCESS

An **I.P.M. Policy Draft** has been written. The policy will be submitted to the College Administration during the upcoming Winter Quarter (2001/02). Some progress has been made in mapping specific areas of campus, but an overall "I.P.M." map of the entire campus has not been completed. No campus forms exist specific to I.P.M., although we now note I.P.M. treatments on our standard Pesticide Application Form.

TECHNIQUES BEING USED

- Deep mulch (12" – 18") is applied to recently weeded beds. We typically use our stockpile of donated wood chips that are available from tree services working near the campus.
- Purple Loosestrife is removed annually in August from the campus wetland areas, before flowers fade. We began removing loosestrife annually about 10 years ago and initially were dumping several dozen large garbage bags of plants. This year we found only scattered solitary plants and collected and disposed of only three large garbage bags of plants.
- Vinegar and flame weeding have been applied in pavement cracks and crevasses (such as brick walks and where asphalt paving meets concrete curb/gutter).
- Twice this past summer and early fall, college office staff were released from their regular assignments to come out to the grounds and hand weed in a campus event that was promoted as a "Siege On Weeds".
- Some Round-Up has been applied in broad areas of gravel parking lots however this is not an "annual practice" but is based on the maintenance needs observed in individual areas. We also have sprayed lawns and mowed areas where we are enlarging mulched areas around selected trees and shrubs to protect them from mechanical damage and to simplify and reduce mowing.

IMPLEMENTATION PROBLEMS

- There has been a lack of educational materials suitable for communicating I.P.M. principles with those that are unfamiliar with institutional grounds and facilities management. If such materials were available, the acceptance and understanding of the value of an Integrated Pest Management Program would be enhanced.

COST COMPARISON

- A rigorous cost comparison between this year and previous years has not been fully developed.

- At North Seattle Community College we have been applying Integrated Pest Management Principles for many years. Because of this fact, the application of chemicals of any kind to our grounds and buildings has historically been very low.

Olympic College

Update of Implementation Process

At Olympic College we have drafted our IPM plan. It is our intent to reduce any potential human hazard or to protect against a significant threat to public safety. Prevent loss or damage to structures or property, and to enhance the quality of life for staff, students, the public, and others. After an inspection, IPM control strategy has been determined.

Techniques Being Used

Exclusion, or access denial of pests into buildings. We have used mechanical control of weeds in the planting beds, biological control by mulching with bark, and over-planting with desired plant material. Olympic College uses disease and pest resistant planting materials as much as possible and upon availability. Removal of diseased trees and plants has also been implemented. We also use the least toxic pesticide when spraying is necessary. Records are kept of all control measures including pesticide applications. These records are used to evaluate results and to create a history to anticipate future pest problems.

Implementation Problems Being Encountered

Education is an ongoing activity with each pest situation to educate parties involved as to the cause of pest problems, the non-toxic measures that can be taken to control them, the risk if any, involved with the pest infestation and the control measure. We here at Olympic College would like to see more in depth and ongoing training for the IPM program. It is fairly new to us, so any and all information that we can acquire would be to our benefit to us as well as the community.

Cost Comparison

Since we have started using IPM prescriptions for various problems, our cost has increased slightly, as we had to acquire more equipment, and supplies. However our costs should decrease now that we have the proper equipment. However, what also needs to be taken into consideration and far as the costs goes is the weather that we have been having, as you this does affect the growth rates and infestations of pests and weeds. The mild winter did not help with keeping costs down because reproduction of certain pests and weeds did not die off as they would have normally. We have used more mechanical control methods than use of pesticides in our IPM program. As to date we have not determined which is more cost effective.

Peninsula College

Peninsula College is progressing toward our goals of lower pesticide usage campus wide. We have instituted intense *"Cultural Control"* methods, which has allowed us to see moderate improvement toward lesser usage of pesticides. However, we have also seen an increased level of manpower hours, which are needed to maintain pesticide free campus areas.

This year we have increased our campus division from three to four areas. Included with interior, exterior, and rodent management--we now have the athletic field that is an additional 129,00 square feet, or 2.9 acres of sports turf. This will impact our IPM for the campus and we will continue to make adjustments as we progress.

Interior:
Peninsula College has had minimal carpenter and mulching ant problems. We have continued an aggressive pruning and cutting of plants and shrubs around susceptible buildings which have shown infestations in the past. We are currently contracting out our pesticide control for ants in certain areas. Our contractor has used spot treatments around one building using a granular pesticide. The contractor also targets cockroaches and flies using traps and glue-boards in the same building where ants have been treated. Our kitchen/dinning glue-boards have been 50% full of targeted insects and control is progressing well with minimum usage of pesticides. We will be continuing the contract to help augment our IPM for interior areas.

Exterior:
As mentioned, our campus now is divided into four areas targeted for IPM strategies. They are turf, ornamentals, bark beds, and athletic field.

Lurt- Moss and thatch have not been problems this year. We have monitored our campus wide turf throughout this growing season and haven't encountered too many problems. Peninsula College has shown good improvement in our turf condition, which has contributed, to better fertilizing and watering. With the exception of the athletic field we have lowered our fertilizing from three applications to only two.

The broadleaf problems in campus wide turf have been controlled through a one-time application of a selective broadleaf pesticide. We have incorporated an intense aerating program, which has created a healthier non-compacted turf base. We continue to anticipate an annual application of a selective broadleaf pesticide to control broadleaf weeds in our turf.

Ornamentals: Peninsula College continues to implement native plant selection for new shrubbery along with bark beds, which have a felt base to control weeds. Because of our aggressive *"Cultural Control"* methods, which include hand aeration in bark, we have had minimal problems with powdery mildew. The brown rot problems on the ornamental cherry trees are being controlled through hand sanitation. . Peninsula College has not used fungicides this year and does not anticipate using fungicides next year. Our IPM strategies for powdery milder and other funguses are progressing well, and we hope to be herbicide free for the first time in our history.

Peninsula College has begun monitoring our aphid problem on birch trees and ornamental plum trees, we have decided to see if our *"Economic Threshold"* would be surpassed if we discontinued our pesticide application for aphids. This year we have not treated the aphids, and we haven't noticed an increase in damage. Next year we will continue to monitor the aphids and hopefully we will be able to discontinue pesticides to control aphids.

Bark: Peninsula College continues to use *"Cultural Control"* methods to decrease the amount of pesticides used in bark beds. We have aggressively hand aerated the bark and used manpower to control fungus and weeds in bark. Peninsula College continues to use Roundup and Finale in spot treatments for weeds. Pre-emergence pesticides have not been used in any area on Peninsula College this year. By next year we hope to completely eliminate pre-emergence pesticide use for the first time in the history of Peninsula College.

Athletic Field. - This is the first year that the athletic field has been in full use. After the completion of the sports turf, we took samples of the soil and sent it to the University of Portland for a composition break down. The university sent us back a fertilizer and watering prescription based upon the needs of the soil, and we have incorporated an aggressive aeration and watering program along with it. This year we have applied a selective broadleaf systemic to the turf once. We still don't know if we will have to apply the pesticide twice per year. Peninsula is in the process off continually monitoring the weeds in the athletic turf.

Peninsula College is contracting out our rodent IPM. Included in the contractor's rodent IPM are wind-up rat and mice traps. Since contracting out the rodent control we have seen minimal rodent problems. Peninsula College continues to sanitize exterior kitchen areas, dumpster areas and trash can areas. We feel we have good control of the rodent population through the contractor and anticipate using the contractor through this next year.

Pierce College

Pierce College consists of two colleges, the Fort Steilacoom College located in Lakewood, and the Puyallup College located in Puyallup. In coordinating efforts the Lead Gardener, the Buildings/Grounds Supervisor, and the Safety Coordinator oversee and control pest management for both colleges. The Lead Gardner supervises the pest management for both colleges. Each college has a Gardner II assisting the Lead Gardner, and recently, we have added a grounds assistant work-study position. All Pierce College grounds personnel are educated and/or licensed through the state of WA on pesticide use.

Section 1: Update of Implementation Process

Our first steps towards implementation of the IPM (integrated pest management) program has been to establish zones throughout Pierce College from high priority to low priority, with the highest priority being placed on issues that pose a safety or health threat, and low priority being place on the less important issues. When we do encounter a pest issue or when a treatment becomes necessary, the Pierce College Facilities and Operations office staff notifies as many people as possible through email and/or posting signs. This communication helps keep an issue from compounding, and it also informs those who would otherwise not know. We are in the process of developing an IPM policy for our colleges and at this time still remain a work in progress. Our grounds, maintenance, safety, and security staff works together to communicate successfully any problems that arise throughout the Colleges. There are no committees for Integrated Pest Management in place at this time, there is however, ongoing training and enormous departmental staff support towards the implementation of IPM practices.

Section 2: Techniques being used

We are incorporating many techniques throughout Pierce College. However, this is a gradual process. We have begun by removing ivy around buildings. This seems to aid in eliminating the populations of bugs and rodents; we have begun the removal/replacement of wood barriers to eliminate decaying wood and the creatures that live in them; This past summer, we did removal of old drainage rock and put in new larger rock to improve drainage; We are using ant traps in side buildings/offices and encouraging people to not eat in offices, or to clean up food stuffs and garbage which aids in the reduction or complete elimination of fruit flies, ants, and other pests; We are using more mulches and more perennial plants in flowerbeds to reduce weed growth; We have relocated some birds out away from the buildings, and we are using netting and Bird-x for more successful bird control around the buildings. The use of Bird-X and netting helps keep the birds out of the building entrances and overhangs alleviating a lot of the defecation problem. Birdhouses were built for a “friendly” woodpecker that was putting holes in the Lakewood campus main building. He has been relocated and is no longer interested in drilling holes in the buildings. There are times when it is necessary to address the pigeon problem with a more aggressive solution without the use of chemicals. The Fort Steilacoom College has predatory birds and a great deal of wildlife that have their homes within a very close proximity to the buildings. It is through many people’s efforts taken to reduce the use of chemicals, to ensure that there is as little impact upon this wildlife as possible. When it does becomes necessary to use pesticides, herbicides, or insecticides, the least

toxic ones are chosen. We have found that the use of vinegar in the sidewalks cracks for weed control is very successful and not as harmful as roundup.

Section 3: Implementation Problems being encountered

There is a continued effort to pursue on going education and rectification for those working on the Pierce College grounds. Contractors are used for the lawn fertilizing and weed control when necessary. If necessary, the use of fertilizer, herbicides, and insecticides is done either on a day when classes are not in session, or during class breaks. Unfortunately, the budget does not allow for the addition of new staff and is very limited on being able to bring in contractors or other agencies to assist. We would like to see more training available and be able to incorporate the support/assistance from other departments throughout our colleges.

Section 4: Cost Comparison

Less herbicides were used in Puyallup, but the need to increase the use of roundup and surflan at the Fort Steilacoom College seemed to even the savings out. There was no use of any broad leaf control on grass so the cost overall has gone down.

Walla Walla Community College

Update of Implementation Process

I am working with our Plant Facilities supervisor to get our Integrated Pest Policy adopted. Hopefully this will happen within the next month. Educating our staff has been a slow process. I have a Power Point presentation that I have shown to the Grounds crew. Next will be the Custodial staff and finally to the Administration. This will be an ongoing project as new people are always being hired and they will need to be informed of our IPM policy.

The staff comes to the Ground's crew if any pesticide has to be sprayed. Suggestions for alternative control methods are always being suggested and discussed.
Flagging the area being sprayed is our way of carrying out notification of pesticide use. All entrances are posted with caution flags.

One of the areas we need to work on is our reporting of pest problems. To help with this, I have given all of our crew reporting sheets to carry in each vehicle. If they are available and handy, then it will be a reminder to fill them out.

The library in our shop area is adequate, but we also have access to several professors that have extensive information and knowledge in all areas of IPM. We have been teaching IPM to our students for quite awhile, so there are a number of resources available.

We have divided our turf and landscape areas into separate entities. The reason for this is; they are all different in water requirements, planting materials, wear, weed problems, and disease problems. Following is a partial list and some of the problems we have encountered and some of the solutions.

- Baseball – Crab grass in the outfield (pre emergence applied in the spring), monitor the problem
- Softball – Dry area down through the middle of the outfield (work on the irrigation and monitor)
- Soccer – Fall soccer program – needs extra fertilizer (add fertilizer at least every month) - high wear area (aerate these areas) – monitor the field for any problems, do a soil probe every two weeks to check on moisture level
- Vo-Tech – shaded area of turf – requires less water (turn irrigation down and water less days, keep monitoring)
- Landscaped area in parking lot – needs more water (put this area on a weekly hand water schedule) - has a field bindweed problem (apply Surflan, a pre emergence and monitor)
- Landscaped area by China Pavilion – new planting, needs to be watched for water problems (put on a weekly schedule for deadheading and monitoring)– combination of perennials and annuals
- Landscaped area at Golf Lab –has a nut sedge problem (weekly schedule for monitoring)

As you can see, each area has its own problems. By separating them out and identifying the problems, we are able to keep ahead them.

We do a site survey in the spring and fall. Our consultant is in attendance at this time. Any problems we have are identified and solutions to these problems are discussed. A soil test is done in the spring to ascertain where we are with fertilizer, thatch, micronutrients and organic material. We do a soil probe at least five times during the year to see where our moisture level is and to check on our

thatch. We were not able to top dress this year and it showed up in our thatch layer. We will to have to do something next year to alleviate this problem.

Techniques being used

One of our main solutions to our turf problems is to keep the turf growing vigorously and keep it healthy. We have fertilized more frequently this year and it shows. We also over seeded with a blend of 70% rye grass, 30% Kentucky Blue grass. We needed the sodding ability of the Blue grass to help fill in on our sports fields. We have noticed an improvement on our soccer field already.

We sprayed only once this year on our sports fields. Timing is so important. When this was done, everything was in bloom and growing vigorously. The chemical did a tremendous job.

On all of our new landscaped areas, we put fabric down and use mulch on top. We have gone almost exclusively to drip irrigation in these areas. We have fewer weeds, plus we are conserving water. Also, the plantings are designed for each area so we will not have to replant in the future because they have out grown their area.

The nut sedge problem at our Golf lab is constantly being monitored. We mechanically remove each plant either by digging or by hand pulling. Since it produces nuts underground, the area is dug up and the nuts are removed. This whole area is planted to annuals and perennials so chemical removal would be impossible. As of a few days ago, I have not found a new plant growing.

We hand weed all of our annual flowerbeds and put down either Snapshot or spray with Surflan. This has worked well. We did not see any weed problems until this fall and those were taken care of with hand weeding.

Our Fairy Rings were back this fall. We have several people coming out to campus that harvest the mushrooms. They say they are edible, so most of the mushrooms disappear. We have also been doing the exchange of the plugs from one ring to another. This has been an effective method of control.

Oxalis is a continual problem in several areas on campus. We use Confront with Barricade to control this. The Confront really does a nice job of killing the Oxalis and the Barricade keeps it from germinating. Many of the areas have been cleaned up by this combination. This is usually done in the spring before it really gets growing.

All of our landscaped areas were sprayed with Surflan. We got so-so control. The reason for this is the bark or mulch should be wet when Surflan is being used. We did not know this. When we went back and sprayed again with the bark wet, we had better results.

We have gone to a fall fertility program. We put on 21-2-21 in November or December. This gets our turf off to a good start in the spring and we have less disease problems to deal with. We had rust in only one place this year compared to several places last year. Our turf seemed to get through the summer in better shape because of this application.

The watering schedule changed a great deal this year. We did not have enough water to water every day as in the past, so we went to every other day. We had some dry spots, but with extra water in these areas, it was not bad.

We changed our height of cut for the summer schedule. We went to 3". This helped not only with our watering schedule, but also, with the weed problems in our turf areas. It seemed to shade out some of the weeds and our Bermuda grass did not like this practice. It really slowed it down.

Implementation Problems

We have been trying to buy an over seeder and a top dresser. Both of these pieces of equipment would help us in our IPM program. We would like to over seed at least two times a year and maybe more on our sports fields. They get so much wear during the playing season, if we could over seed, we would be able to keep the turf established and not have the weed problem we have now.

Top dressing is high on our list of things to do. Unfortunately, this is not a high priority on the administration's list. We have a clay-based soil profile. Not only do we need to top dress to help alleviate this problem, but we also have a thatch problem. Thatching will help this but it is rough on the grass, especially if it is done before the playing season. We do not have the ability to fracture the soil or to verticut. Even if we did not own a top dresser, just being able to buy the sand and rent one would help.

Cost Comparisons

Last year we spent $4,830.10. This included the fertilizer and chemicals we used. This year we have spent $4,668.38 so far and this includes the same items. From this comparison, there has been a slight drop in expenditures. One place we are saving money is on Roundup. With the Surflan application in the spring, we have used less Roundup. Also, our turf is healthier and denser. After our pre emergence application in the spring, we have only had to spot spray the broadleafs in the summer.

Whatcom Community College

Whatcom Community College operates on a 40 – acre campus that is only 14 years old. Below is a summary of the different problems we had had in the last years and the corrective action taken.

Interior Problems

Ant infestations in Cascade Hall were a problem. Over the past eight years we had had numerous ant problems in this facility. WE tried some chemical sprays early on is small applications, only t realize the problem needed professional help. With professional help the ant problem in our Cascade Hall has all but been eliminated.

We have had several problems with mice in the last 14 years but they were handled with mousetraps.

Exterior Problems

Yellow jackets were a problem during the last 4 months but not out of control. On several occasions we had to spray with a can of insecticide to deal with this problem. I feel the exterior pest problems are very limited due to the fact that our campus is new. With the new campus we have been careful to keep an eye out for unwanted plants.

With wetlands along the north edge of campus, I feel we have a very healthy campus. These wetlands are used in ecology class studies. In short our campus grounds are part of our classrooms and we want to keep it that way. Weed killers are used only to knock the weeds down on sidewalks and on a limited basis.

It is a great concern that the Whatcom Community College is a safe place for all. By limiting the use of chemical, by creating a habitat uninviting to pest, and by keeping the unwanted plants off campus, we feel we are doing so.

Renton Technical College

The Renton Technical College campus is a developed 33 – acre site within the city limits or Renton, Washington. The grounds department is responsible for the grounds and landscape maintenance. We have been using IPM practices since 1997. We have 2 full time employees dedicated to this project.

Update of Implementation Process

As par the IPM requirements, we have ensured that state and local pesticide regulations have been met by assuring appropriate label requirements, worker protection, record keeping, notification, posting, applicator licensing and hazardous material storage and disposal are followed.

The city or Renton requires that we put no more than 5% nitrogen on our lawns over a 5 plus acre area. This is because the campus is sitting on an aquifer that is only 20 feet deep.

The gaps in our program are as follows; I feel my hands are tied as far as what I can do without more input from the management.

Techniques Being Used

At RTC we have had problems with an ant infestation. We have found bait traps to be the most effective method of controlling them. We have also had problems with rodents. Mechanical devices are used (when practical) for rodent control. When mechanical devices fail, protected bait stations may be used. Rodent control is also a contracted service with the vendor also employing IPM methods.

I have found that establishing a healthy ground cover, which requires less irrigation, helps to deteriorate weeds in general, during summer months.

Implementation Problems Being Encountered

Given the amount of work to be done in a day, it is difficult to properly monitor on a consistent basis. The lack of manpower available through our current budget is not sufficient to over come this hurdle.

Cost Comparison

We have reduced the amount of pesticide used on campus by 30%, and therefore we have reduced our costs by that much also.