Forest Park Ivy Removal Project

"We've got a lot of pull"

Decennial Monitoring Report

1994 2004

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NO IVY LEAGUE

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Lessons Learned: Removal Procedures

After 10 years, the Ivy Removal Project now has a better sense of the questions we should be asking and the issues we should be addressing. The Decennial Monitoring Project has provided an opportunity for reflection regarding removal work in the Park, and the steps we need to take to increase our effectiveness still further.

Based on 10 years of experience and conclusions drawn from the Decennial Monitoring Project, the lessons we have learned about ivy removal can be organized under two major headings:

Select activities and work sites that maximize the overall impact of your efforts.

- In most circumstances within a forest environment or a woods re-vegetation occurs naturally after ivy is removed, thus, removal efforts take priority over planting native species. In special circumstances such as urban edges, riparian zones or very steep slopes where re-infestation or other unintended consequences are likely, a restoration plan needs to be in place before ivy is removed.
- Removing mature ivy from trees is far more important than removing ivy on the ground. Cutting mature ivy on trees not only stops the spread of seeds but also protects the forest ecosystem from the loss of canopy cover.
- Going beyond girdling ivy on the trunk of a tree to create an ivy-free buffer area or "life-saver" around the tree limits re-growth for several years. This allows work to be accomplished in other areas rather than continually removing ivy from the same trees.
- Attempts to eradicate ivy on a landscape scale is inefficient because removing the final 10% of the ivy takes as much time as removing the initial 90%. Instead, eliminate 90% of the ivy at a site and move on to bring other areas up to this level of control. Also, at a sustainable 90% control level native species can readily repopulate the area.
- Urban edges, trail systems, and other highly disrupted areas are low priority for work sites because the same factors that produced the infestation will lead to rapid re-infection. However, work at such highly visible sites can be useful for educating the public about the nature and extent of the invasive species problem.
- Follow-up is the most critical element for effective removal. It is very unlikely that you will get "all" of the ivy in your first visit to a site. Returning at 6-month intervals not only makes it easier to find ivy that was missed earlier but also allows you to remove ivy that was newly sprouted from seed after the area was "cleared."

There is no "one best approach" for ivy removal that applies to every site.

- The removal approach at any given site needs to consider a combination of three factors: 1) the nature of that site; 2) the nature of the infestation at that site; 3) the work force available to work.
- There are many different techniques for controlling ivy. As long as a method is effective, legal, safe, ethical, and accountable, it should be considered.
- Pay attention to the human element. Your choice of a removal method has to consider not only the volunteers and paid workers available at that site, but also the user groups, neighbors, and other stakeholders associated with that site.
- In the long run, consistent follow-up at work sites is more important than the specific method used in initial removal efforts.

Lessons Learned: The Bigger Picture

The lessons learned in these ten years go beyond the technical aspects of ivy removal to provide a bigger picture of what it takes to address the problem. One crucial element is a coordinated strategy to control the spread of ivy. Another equally important element involves the "human side of the equation," requiring both environmental education and changes in public policy.

Creating a Strategy to Control the Spread of Ivy

There are four basic priorities for removal efforts, which should be considered in the following order of importance:

- **Stop the Seeds**: Dispersal of seeds is the number one issue needing immediate and sustained attention for the control of ivy. Ivy seeds are infecting new areas continuously as well as re-infecting areas where ivy was removed. Until we can control the spread of ivy through seeds, it is futile to clear areas on the ground because will quickly be re-infested by new seeds. Reducing seed sources needs to be the key priority in ivy control for the foreseeable future.
- **Save the Trees:** Once the forest canopy is lost due to ivy infestation, the ecosystem becomes more vulnerable to a wider range of invasive plants.
- **Eliminate Isolated Patches**: Infestations in the "core" sections of natural areas can remain hidden until they reach major scale and spread seed into areas that were free of ivy.
- **Reduce Biomass**: Removing large patches of ivy from the ground is the lowest priority for control at this stage, and only makes sense in special circumstances, such as an isolated infestation in a natural area that can be easily revisited for follow-up.

The Human Side of the Equation: Thinking Regionally and Acting Locally

- This is a large-scale problem that requires partnerships on both a local and regional basis. Long-term success depends on getting multiple partners to cooperate and collaborate.
- Ivy in the Pacific Northwest plays a role similar to kudzu in other parts of the U.S. by educating the public about noxious weed and invasive species issues. The public must see how bad the problem is before it will support the actions needed to control this threat.
- Ivy and invasive plants are not just a technical problem. This is a problem with cultural dimensions, and we must cultivate values that will cause a change in attitudes and behaviors, and build a constituency for changing policy development.
- We must address the potential for people being either overwhelmed by the enormity of the problem or overly optimistic about a silver bullet that will make the problem go away. Education and motivation are essential tools to avoid people becoming overwhelmed or overly optimistic.

Ultimately, our efforts must be sustained and institutionalized, so that our human resources will be equal to the magnitude of the challenge from ivy and other invasive plants

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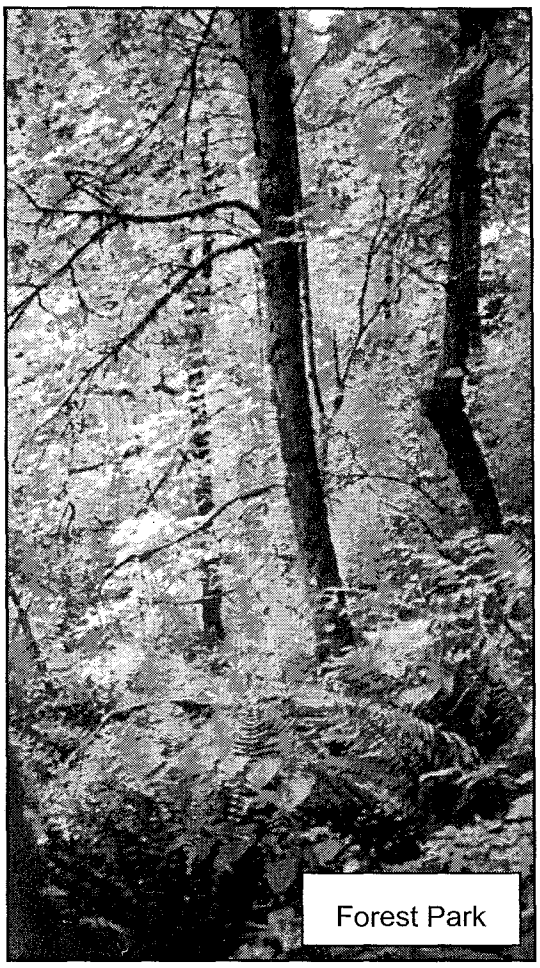
Abstract

More than 90 work sites ranging from less than an acre to more than 25 acres where Hedera helix had been removed manually over a ten-year period by both volunteers and paid youth crews were evaluated for effectiveness. Within a seven-week period in the summer of 2003, a team of college interns and high school youth used a monitoring format and protocol developed internally with peer review as well in consultation with research professionals. A preliminary report summarizing the data recorded and the field notes was prepared as the team proceeded with the monitoring project. The preliminary results were then compared to condition and work activity documentation for each site during the fall and winter of 2003-2004 with follow-up field visits conducted for more than 30 sites to verify specific information in the spring and summer of 2004. A database was developed to facilitate analysis and use of data for planning purposes. Findings and recommendations from the analysis illustrate both successes and shortcomings of the ten-year community based invasive species intervention effort in achieving measurable and/or sustainable habitat restoration. They also indicate priorities and strategies for planning future removal activities. In addition to assessing the effectiveness of ten years effort to control a specific invasive plant species using a particular approach, the requirements necessary for and the value of such projects as an environmental education activity for high school aged youth are demonstrated.

I. Introduction


Forest Park

Forest Park is North America's largest urban forest. Set aside as a natural area within Portland's city limits, the 5400+ acres include many miles of hiking trails, dedicated bicycle paths, and unsurpassed opportunities to connect with the forest environment. Forest Park is a vital part of Portland's landscape and an invaluable resource to local residents.

Just as the Park has an impact on the people that enjoy it, Forest Park's accessibility is the factor that puts it at risk as a natural area. The Park has a history of disturbances, however, including logging, home sites, road construction, and utility access. The largest threats are invasive plant species because they systematically destroy forest infrastructure thus altering the ecosystem. A primary goal of the Forest Park Ivy Removal Project has been to control the spread of invasive species into and within the Park.

Project Overview:

The Ivy Removal Project, also known as The No Ivy League (NIL), began in 1993-1994 as an invasive species intervention initiative to determine the extent to which summer youth crews could reduce the adverse ecological impacts of Hedera Helix on an urban forest environment.

The Project's mission, as is outlined in its Strategic Plan[1] is to restore the natural habitat of Forest Park by removing invasive species, especially English Ivy, through youth development programs, environmental education, and community participation

[1] See Appendix A.

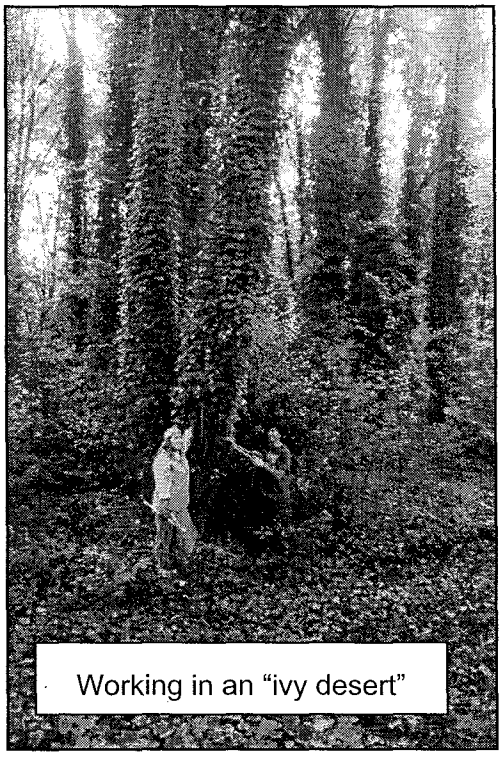
while promoting research, providing technical assistance, and seeking relevant societal changes.

Why do we remove English Ivy?

Although a great number of invasive plants are infesting Forest Park, English ivy is the worst. Brought by early settlers, ivy escaped from home sites and became established in Forest Park. It has no natural enemies to keep it under control and our temperate rain forest provides ideal growing conditions.

Ivy suffocates ground cover, smothers native plant seedlings, overwhelms shrubs, destroys trees, and provides little shelter but no food for native wildlife. When it crowds out native plants on stream banks, it degrades water quality.

In a forest environment ivy grows up trees, seeking more light to aid its maturation process. When ivy reaches the apex of the tree, it blooms and forms berries that spread seed to start new infestations elsewhere. Ivy causes the pre-mature demise of trees and canopy loss. With increased light, ivy dominates a wasteland of alien invader plants that do not provide habitat for our diverse wildlife but harbors undesirable vermin.



Working in an "ivy desert"

The No Ivy League focuses on increasing biodiversity and protecting the canopy. Other invasive plants are also removed such as Clematis, English Holly, Horse Chestnut, Norway Maple, Nightshade, Garlic Mustard, Himalayan Blackberry, English Laurel, Morning Glory, and Broom. Ivy is a major target because its "evergreen" nature causes year round consequences. It also thrives in deep shade allowing it to spread rapidly and cause great damage in deep recesses of the forest before it is known to be present.

Indeed, if the NIL hadn't begun to remove ivy from the Park, its landscape would be drastically different. Instead of an urban forest, the areas that immediately border the city would be experiencing major canopy collapse and the farther reaches would be pocked with severe, fruiting ivy infections.

Purpose of this Report:

With no readily available model upon which to base the Project's organization and operation, community development concepts were integrated with resource management planning processes to develop strategies and procedures. Following the principles of 'adaptive management'[2], five basic questions have served as a framework to foster constant evaluation of removal plans and work performed.

The questions are:

1. **What is the nature of the problem (patch to desert to growing edge)?**
2. **What is the extent of the problem?**
3. **What methods are effective?**
4. **What impediments exist?**
5. **What resources/support do we have?**

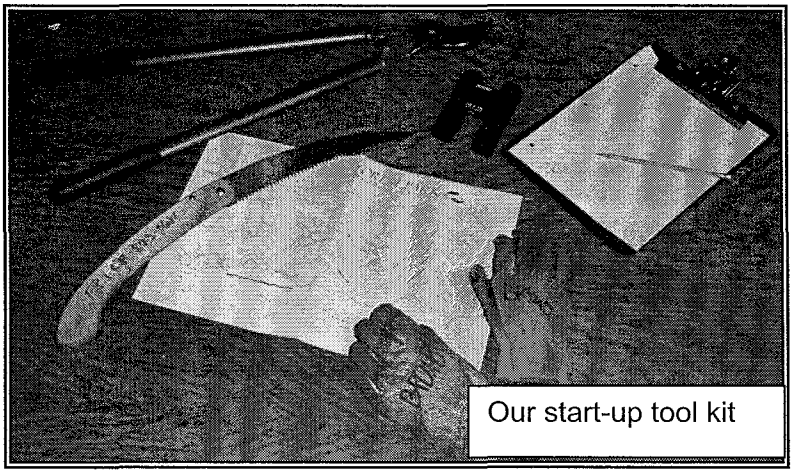
Monitoring activity began immediately in 1994 but was steadily improved and developed over time with a plan to conduct an overall assessment in ten years. Again these five questions gave a framework reevaluate our understanding of the ivy problem and the methods used to combat it.

The Decennial Monitoring Project is meant, as one element of its purpose, to assess the effectiveness of manual ivy removal methods performed by community volunteers and youth crews. The findings are related to changes in biodiversity, levels of ivy infestation, and observable re-growth of ivy. It provides recommendations for setting priorities, managing resources, selecting work areas, and outlines issues needing further investigation or research as another part of its purpose. It sets forth the successes and shortcomings of this community based program as a framework for increasing effectiveness and as a guide to similar initiatives. It also tests how youth can be most productively engaged in monitoring as an environmental education activity and the extent to which youth can design and implement monitoring tools and methods.

II. Protocol & Methods:

History of the reaches survey, worksite monitoring and documentation

Inventory of ivy and other key indicator species occurred over a period of time, as personnel were available to perform the surveys. Initially, infestations were inventoried from the perspective of the trail, Fire lane, and utility road system. Later, cross-country surveys were conducted to identify the location of infestations and to locate/eliminate isolated patches. These were performed from a southerly to a northerly direction using established trails/firelanes as starting and ending points. Early GPS surveys in the mid to late 1990's were unsatisfactory due to the unreliability of points taken under the canopy and the limitations of the system at that time. By the end of 1999, the majority of the Park had been surveyed for infestations except for the majority of the area between Leif Erikson Road gated access, and St. Helen's Road where there are very few trails and precipitous terrain. An inventory and survey protocol was developed in 2000 and 2001



Our start-up tool kit

The purposes of the Decennial Monitoring Project are:

1. **to assess the effectiveness of removal activity within the Park**
2. **to diagnose the successes and failures of removal activities**
3. **to provide an environmental education activity as a part of the Project's youth development focus**
4. **to provide an opportunity for reflection on the overall activities of the Project as related to the control of English ivy and to identify lessons learned from the experiences**
5. **to provide a basis for developing the next phase of the project**

[2] Adaptive management is a process that is used primarily when working with systems that are changeable in nature such as a natural resource. It is a cyclical process that involves assessment of the

to access this part of the Park by following the reaches or drainages of the Park from east to west with ingress at the highest accessible elevation of the reach and egress at or near St. Helen's Road. Field trials were conducted in the winter of 2000 and 2001 to develop a protocol with particular attention given to safety and low impact. The protocol was field tested in the summer of 2001 to determine standards and preparation needed for teams of youth crewmembers to conduct surveys of the reaches. 17 reaches were surveyed in the summer of 2002 with an additional 8 conducted in 2003 when the decennial monitoring of work sites was also conducted. Although 5 upper reaches have yet to be completely surveyed due to major portions of these being located on private property, the overall distribution of the surveyed reaches provides a reasonably comprehensive inventory of the most interior parts of the Park.

Since its inception in 1994, the Project has understood the need for adequate documentation and monitoring protocol that would allow tracking of progress and planning for the future in order to implement an effective Ivy management and control strategy.

The **Site Document** [3]was the first instrument developed to achieve this objective and was adapted from data collection and assessment methods used in other natural resource management programs.

The form had the following fields:

- **location in Forest Park,**
- **description of site (extent of ivy, other invasives and natives.),**
- **actions taken (work performed) and**
- **monitoring needs and recommendations.**

Revisions to the site document included:

- **previous ivy removal,**
- **estimated size of patch,**
- **density of patch**
- **the extent of ivy on trees**
- **and actions taken.**

problem. British Columbia Ministry of Forests. http://www.for.gov.bc.ca/hfp/amhome/Amdefs.htm

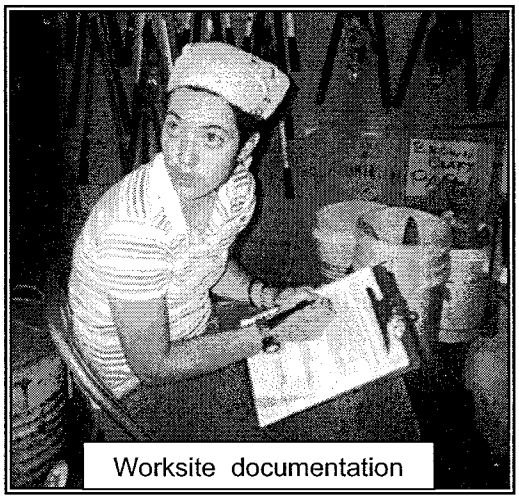
[3] See Appendix for document

In 1995, after one year of field experience, various types of data were identified that would be most useful and most important in selecting work sites for different groups.

A **Work Site Inventory Document**[4] was created that outlined similar information with an emphasis on location, access, topographical site features, native plant and invasive diversity and removal history. Five years into the project, it became evident that in order to perform an adequate ten-year monitoring project a stand-alone monitoring form was needed. The site document and inventory forms had been used as a way to monitor our work, but this method became increasingly cumbersome as the number of inventory and site documents grew.

Monitoring processes used by other natural resource organizations were investigated and natural resource professionals were consulted to develop a functional **monitoring document**[5]. This document was further refined in the summer of 2001 by an intern Martin Evans who was a former youth crewmember. He performed additional research and conducted field-tests Ivy Project youth crews and youth crews from other organizations to develop a workable monitoring instrument and a more defined set of monitoring protocol. The information required by the monitoring allows evaluation of a site's current condition as well as the impact of removal work on the quality of the habitat.

During the summer of 2002, the summer youth crew performed "test runs" and "time trials" at diverse removal sites using the revised monitoring document and methods. Depending on the location in the Park, size of the site, and the terrain, they determined an approximate length of time required for the monitoring of work sites along with information to plan orientation and staging. At the same time, the survey and monitoring of reaches for



Worksite documentation

[4] See Appendix for document
[5] See Appendix for document

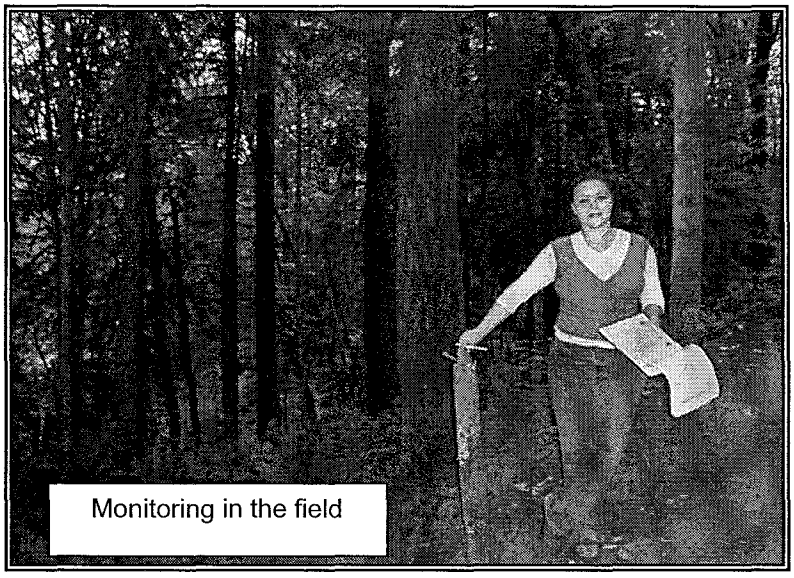
invasive infestations was underway, and was an independent but interconnected part of the decennial monitoring project. This survey provided the first systematic assessment of the nature and extent of ivy and other invasives in inaccessible parts of the Park.

Monitoring planning meeting

In the summer of 2003, the necessary pieces were in place to perform a cumulative monitoring of previous work sites and areas. Once the initial field monitoring was completed, the youth crew developed a spreadsheet to compare the large amounts of monitoring data.

Throughout orientation and planning, visits to field sites, monitoring report preparation, spreadsheet development, and database organization, the cumulative site documents were used for referral, reference and "institutional memory."

Chaordic nature of documentation process



Monitoring in the field

While careful to produce documents supporting the documentation and monitoring objectives, the information recorded on those documents has not always been consistent or complete. This has been largely due to the dynamic and fluid nature of the volunteers and youth crews that fill out those documents.

It can be said that our project functions in a "chaordic" manner, that is to say, we function under a clear set of established principles while, at the same time, striving to deal with the diverse and dynamic nature of our workforce. Fortunately personnel in key positions have been able to bring continuity to the work by carrying through the project's principles and procedures.

The project director and other long term, albeit part-time, youth employees have been responsible for fieldwork being documented completely and accurately as possible. When this has not been possible, they have interpreted the intent of the original recorder using recollections and shared experiences.

Monitoring Methods:

The 2003 Summer Youth Crew conducted field monitoring of over 90 work site areas in July and August 2003. Most of these "work site areas" encompassed multiple adjacent work locations with similar characteristics, therefore greatly reducing the number of areas the crew had to monitor.

Prior to collecting field data, crewmember teams reviewed all Work Site Inventory and Work Site Documentation forms associated with the particular area they were going to visit. When reviewing these documents, crewmembers noted:

Information collected from worksite document archives

- **the initial conditions of the site;**
- **the dates of the first work party and**
- **most recent work party;**
- **the cumulative number of full and partial lifesavers completed between those two dates;**
- **the total number of visits by youth crews and volunteers; and**
- **the locations of individual work sites within the larger work area.**

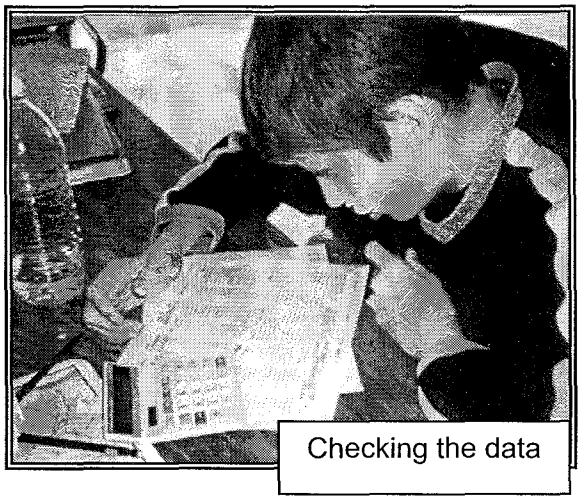
Crewmembers monitoring

This information allowed them put the current condition of the site into historical perspective, which would later facilitate an analysis of the effectiveness of our work.

Information collected in the field

- **specific location of the site;**
- **evidence of any previous removal work;**
- **the density of the canopy in terms of percent coverage;**
- **proximity to a forest edge/urban space;**
- **topography, such as elevation and aspect; and**
- **proximity to water, such as a stream or reach.**

Crewmembers also took photos points at each site to provide a visual, point-in-time description of the site. Then, they summarized findings according to the matrix categories. An electronic database was then organized allowing further standardization of this information:



Checking the data

Database categories

- **habitat type, impact of ivy or other invasives on native diversity/ category of infestation**
- **accessibility/ suitability for volunteers,**
- **number of work parties work performed in the past, effectiveness of work accomplished,**
- **needs for the future of data that had been collected in the field.**

Methods for Analysis:

After monitoring data was gathered for all 90 work-site areas, the information was analyzed to determine how "effective" the work has been overall for the past ten years. By effectiveness means not only the relative amount of ivy that was removed from an

area, but also any improvements to the local habitat that the work has produced. Then, what factors may have contributed to any variations in effectiveness were assessed by looking for any correlation between "effectiveness" and different data sets such as: who did the work, where the work was performed, how frequently the work was performed, etc.

Prior to conducting an overall analysis of removal work performed over the past ten years, the monitoring information gathered from each work site area was summarized into a brief paragraph. In preparing these paragraphs, six points were considered to assess the present condition of a site as well as the impact the work had had on habitat and invasive plant population:

Questions for analysis

1. **Is there an obvious difference in the site as a result of past work? How does the present condition of the site compare to information presented in past Site Documents?**
2. **What specific evidence, if any, is visible of past work, for example, full and/or partial lifesavers, dead/dying ivy on trees, etc?**
3. **Are ivy or invasives still present? If so, how would you describe them using the Categories of Infestation? How does the invasive plant population compare to what it was before any work was performed?**
4. **To what extent does the density and diversity of native species reflect the amount of invasive biomass removed? In other words, is there any evidence of passive restoration?**
5. **Does this site need any special attention? For example: is it an isolated patch? Is there mature and/or blooming ivy? Does the site need continual attention over a period of time? Would the location make a good educational/interpretive site? Is the site appropriate for inexperienced volunteers?**
6. **What would have happened to the site if we had not done anything?**

After crewmembers completed all their work site summaries, the information contained in them was further condensed spreadsheet format, which then allowed us to cross check and compare similar types of information from various sites.

III. Findings, Observations and Lessons Learned

The primary basis for this report is the monitoring project, but the findings included here are not limited to one summer. Rather, included are findings related to all monitoring, survey work and anecdotal data from ten years worth of experience working on to remove ivy in the Park, along with some key research done by other parties. These findings have formed the basis for our work, our understanding of ivy, and our future directions as an organization.

The monitoring project's sites ranged greatly in habitat characteristics, which demonstrates the diversity of native habitats in Forest Park, as well as the variety of ivy infestations where various tactics and strategies were employed.

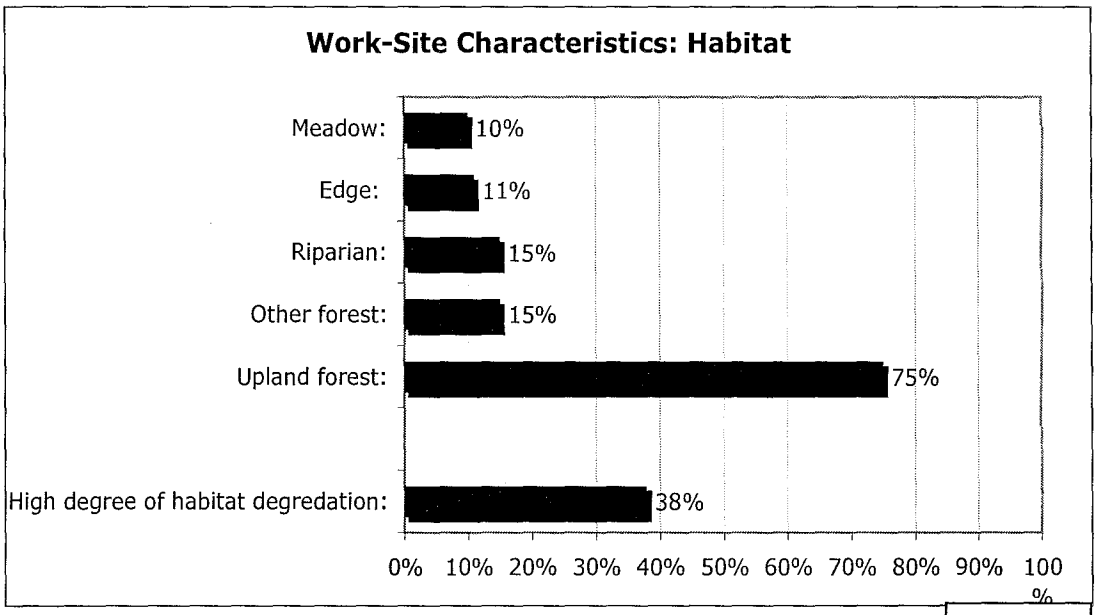


Figure 1

A. Worksite effectiveness:

Effectiveness was determined by the native plant recovery in an area. A worksite was deemed 'very effective' if work accomplished the site had either returned the site to its

natural state or eliminated an isolated spot or patch before it could become a more severe infestation. An effective site increased the bio-diversity of the site and or reduced the level of infestation, whereas a 'semi-effective' site maintained the site's infestation and/or biodiversity at a steady state. An 'ineffective site' had no significant impact on the site's bio-diversity and or level of infestation.

Out of the 91 worksites surveyed in the monitoring project,

- 16 sites were considered 'very effective'
- 20 sites were considered 'effective'
- 28 sites were considered 'semi effective'
- 8 sites were considered 'ineffective'
- 19 sites had no rating

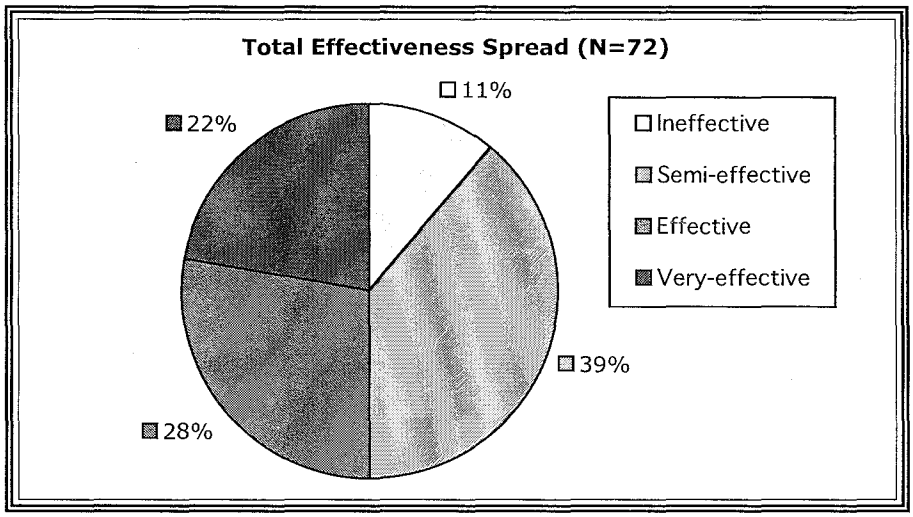


Figure 2

B. Limitations to effectiveness:

Overall, our worksite effectiveness can be characterized as semi-effective to effective. There are many reasons for the limited effectiveness of ivy removal like workforce limitations, the nature of the infestation, and difficulty with worksite logistics.

- Limitations related to workforce includes both issues in the workforce itself, and the removal techniques employed by both volunteers and paid work crews.
    - Too little training or prior experience,
    - Limited physical capability

- Time constraints
- Poor choice of removal methods (e.g. unsystematic groundpull or 'Swiss Cheese')

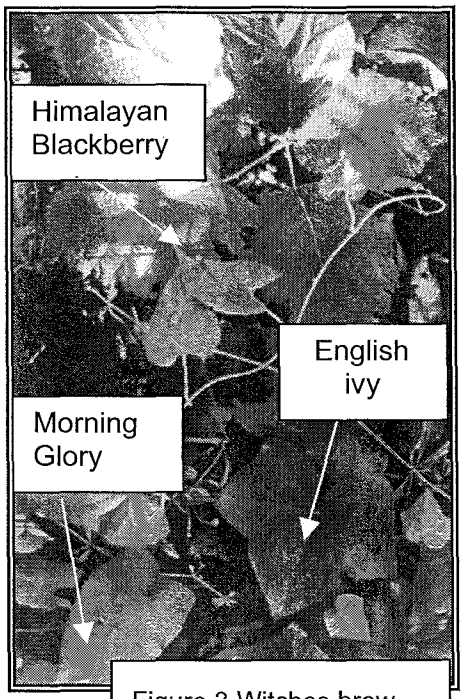


Figure 3 Witches brew

- Limitations related to nature of infestation refer the size and level of infestation and the strategies used.
  - Re-infection by unaddressed seed source
  - Landscape scale, severe level of infestation
  - Other invasives at site take priority over ivy
- Limitations related to worksite logistics refers to the issues at a certain site given the location and other factors that prevented quality ivy removal. These factors determined the type of workforce used in an area, as well as the number of times that an area was revisited.
  - Extreme terrain, such as steep, rocky slopes.
  - Distance from field house. transportation constraints,
  - Transient camps or other deterrents hinder access to work site.
  - Difficult access due to a combination of invasive plant species ('Witches Brew')

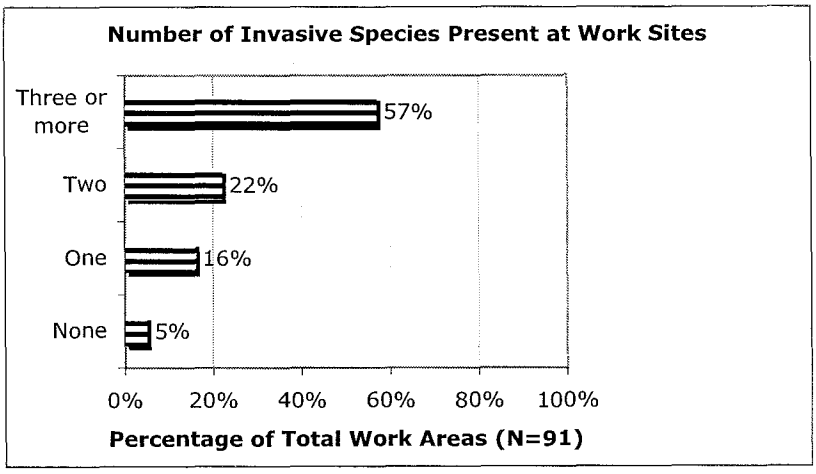


Figure 5 Sometimes a combination of invasive species at a site ("witches brew") limited effectiveness of ivy removal. Often at these sites, other invasive species were prioritized before ivy.

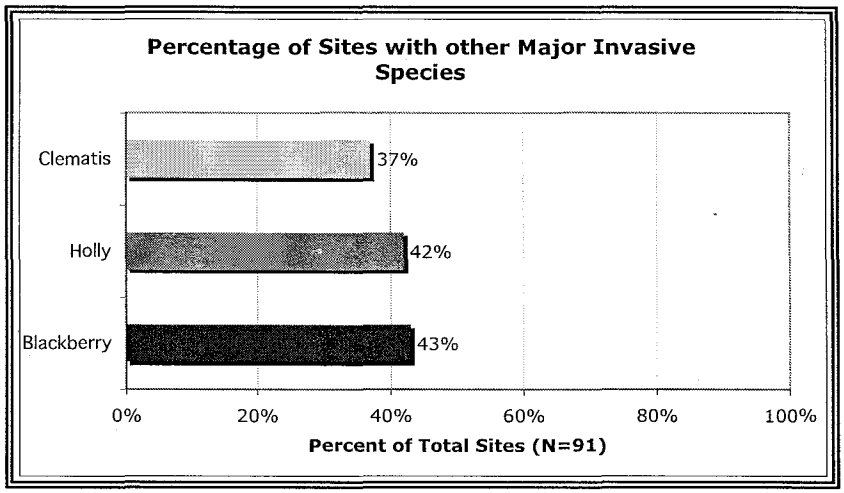


Figure 5

C. Ivy in Forest Park

The following findings were collected primarily during the reaches survey during the summer of 2002. This survey was key to our understanding of the range and scope of the ivy infestation if Forest Park.

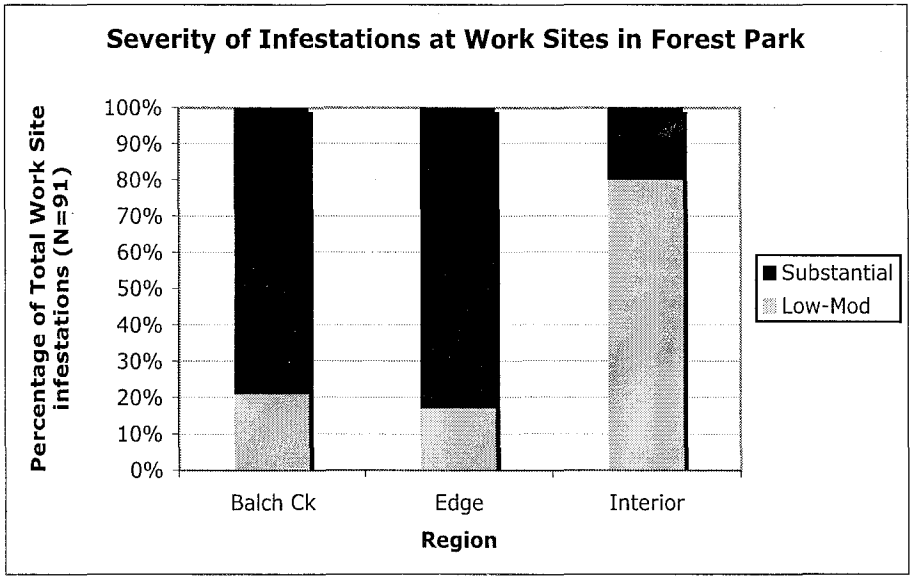


Figure 6

The scope of the problem and the nature of the infestation

The Balch Creek Watershed is the epicenter of the Forest Park English ivy infestation, with isolated patches and infestations significant in number and size every reach in the basin.[6] In addition, there is ivy in almost all urban areas surveyed that

[6] See Figure 6.

border Forest Park. Extensive infestations of blooming ivy tend to be found at edges of the Park or edges within the Park (trails, firelanes, roads, etc). Ivy is not spreading in a wave-like fashion from major bands of infestation along St. Helen's Road or Cornell, for example, but in spots and patches where seed is spread. Some other key findings about the ivy infestation in Forest Park are:

- Generally, when there is a high incidence of infestation along a trail there is a high frequency of isolated patches along nearby reaches and in the areas interior to that trail.
- Away from roads and urban development in both the middle and northern parts of the Park, there is not much ivy, not even isolated patches. [7] Following reaches from the highest elevation to the lowest, it was found that large amounts of invasives are typically found at the park access points. After the initial infestation, there were little to no invasives until the bottom of the reach near St. Helen's.
- Ivy was seen blooming on a single tree in the forest with little or no vegetative presence on the ground.

Other Forest Park findings

- A substantial area of old growth habitat was discovered along a reach in the northern part of the Park. There is a well-established Hemlock population along with a number of ferns not found in other areas of the Park such as Deer Fern along with Maiden Hair that was three feet tall. This area lacked the typical underbrush found in many of the other sections of the Park. No evidence of recent human presence was seen. The location of this area is being suppressed to protect it.
- There are not very many sightings of large mammals throughout the heavily used parts of the Park. However, deep in our reach surveys through the northern parts of the Park, evidence of these creatures exists. Large trampled clearings are often spotted on these reaches along with den-like caverns under uprooted trees and in a hillside. Large amounts of scat filled with berries sometimes are seen also. This could lead one to believe there is a bear or cougar population in the remote areas of the Park.

[7] See Figure 6.

D. Workforce: Volunteers vs. Paid youth crews

One of the major factors in the surveys was to assess sites for volunteer suitability in an effort to plan for future work parties. The data illustrates our process in matching volunteer ability with a particular site, and the factors that determine volunteer effectiveness. Volunteer characteristics needed for "effective" work results:

- Well trained
- Highly motivated
- Physically fit to work on "off trail" terrain.

Matching volunteers to appropriate sites is another vital component in worksite effectiveness. Each site was evaluated on a number of criteria to determine volunteer suitability. Accessibility and terrain factored heavily in determining a site's suitability.

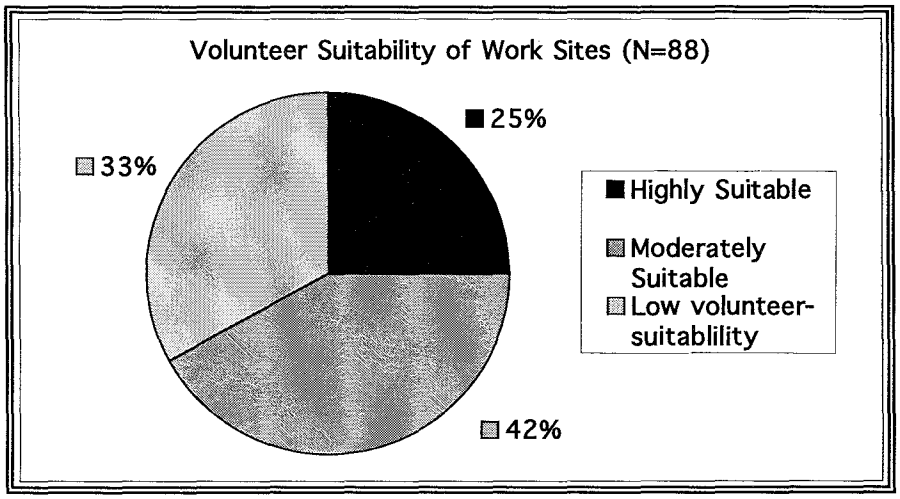


Figure 7

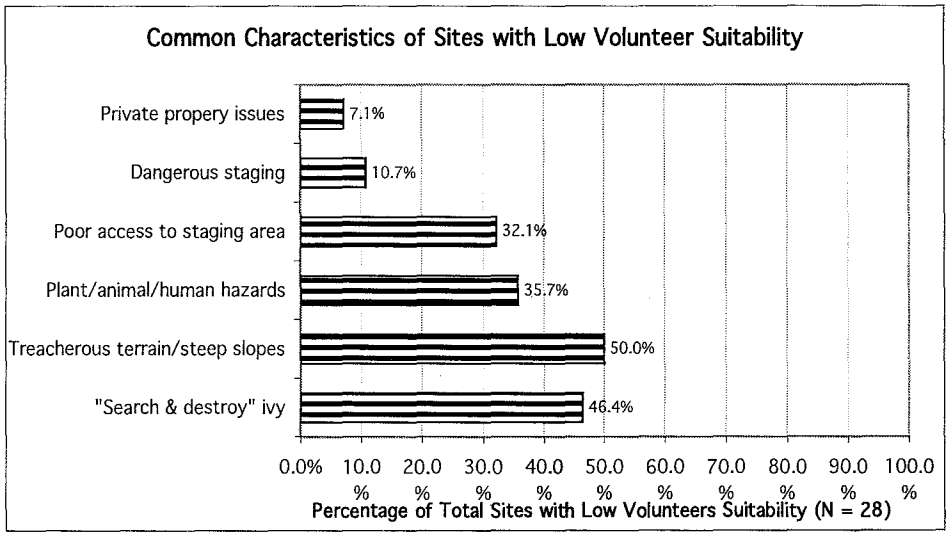
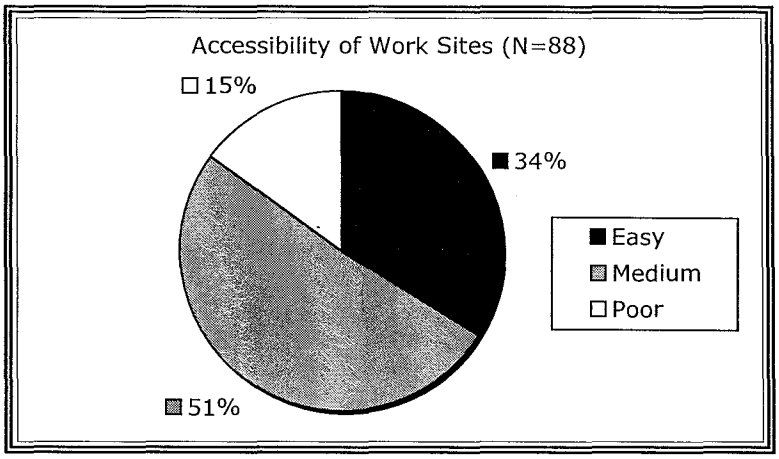


Figure 8

Of the 91 sites monitored:

- 22 were highly suitable for volunteers
- 37 were moderately suitable for volunteers
- 29 had a low volunteer suitability
- 3 had no suitability rating.



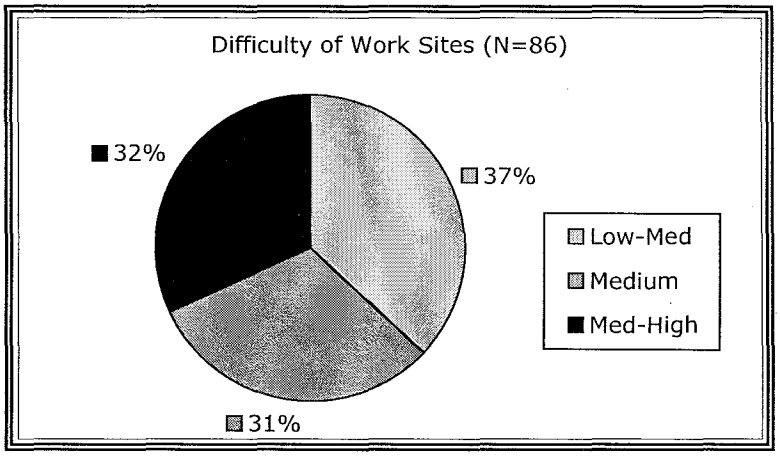


Figure 9 & Figure 10 Accessibility and Difficulty of worksites were major factors in determining worksite suitability for volunteers.

Other key factors in workforce effectiveness:

- Volunteer activities that involve large numbers of people for a one-day effort are effective to serve public relations and educational purposes, but are not the most effective or efficient way to fill the labor gap. So much time is spent orienting to the issues, going through removal techniques, etc, that little work time remains.

- Volunteers work better in an ivy desert than on sparse growth. It is more difficult to remove ivy that is sparse and thinly distributed than it is to remove ivy from an ivy desert, because you need a keen, well-trained eye to spot ivy, and to assure thoroughness. Also, volunteers love the drama of an ivy desert they can see the problem easily, and feel more excited about freeing trees. The ivy's severity works as a motivating factor.
- The Saturday freelance work parties is an adopt-a-site style because it has proven to be very effective in reclaiming habitat. Volunteers are encouraged and enthusiastic to return because they see the difference that they make in habitat health.

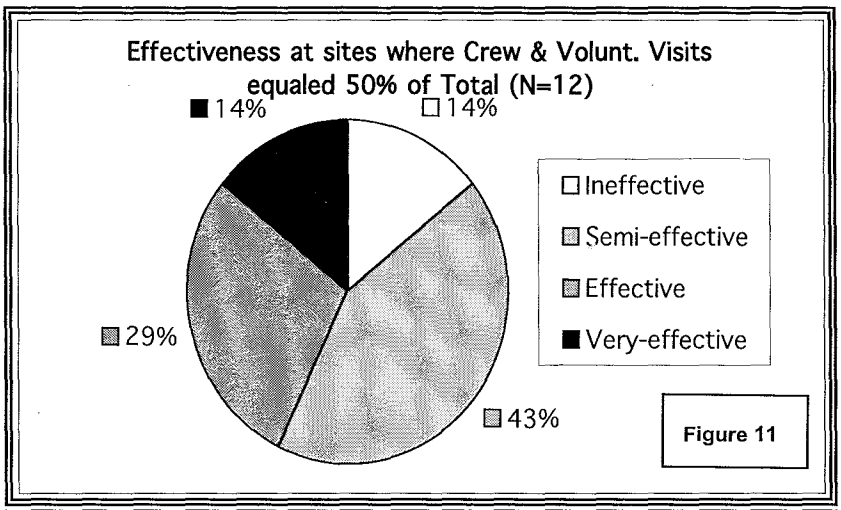


Figure 11

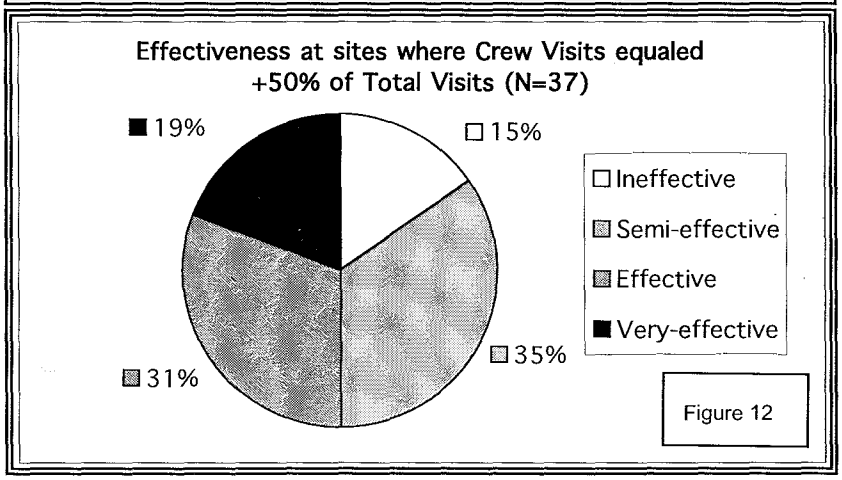
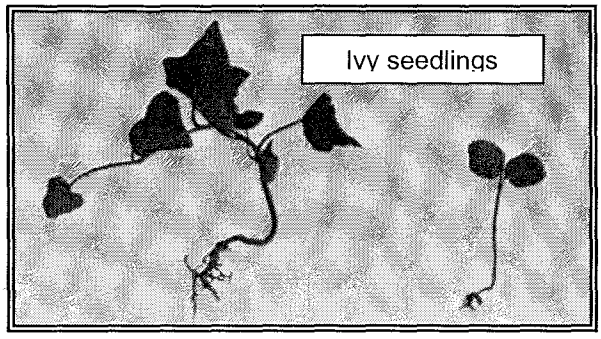


Figure 12

These charts compare the work done by a combination of paid crewmembers and volunteers. Summer youth crews have accomplished the highest quality invasive removal in Forest Park. That said, it is a combination of youth crews, professional groups and community members is the best multifaceted workforce.

E. Peter Lavoissuer's study: a lesson in ivy germination applied to Forest Park



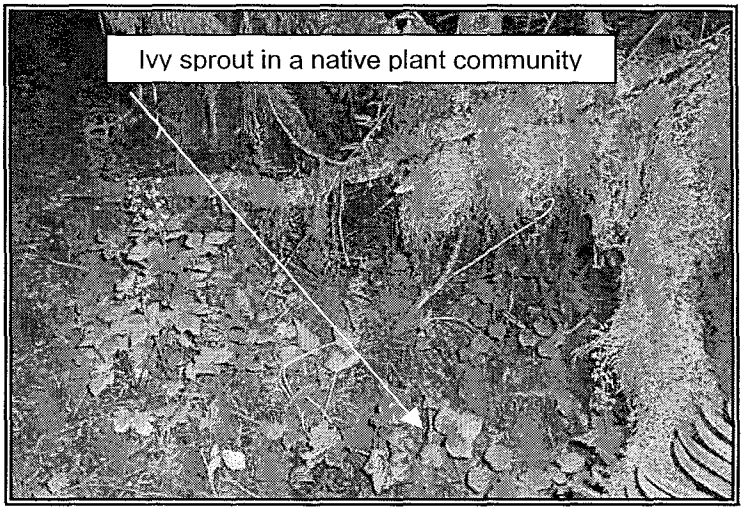
Peter Lavoisseur [8] conducted a study for his master's thesis at Portland State University that hypothesized: in an "ivy desert"[9] there is a greater frequency of clones than of individuals (which would indicate vegetative expansion). After conducting his research, he found the opposite to be true. There were a higher

[8] Levasseur, Peter Robert. (2002). Genetic diversity and clone size in a population of *Hedera Helix* (araliaceae) using rapds. Self Published Masters Thesis: Portland State University.

[9] An Ivy "Desert" is an area completely dominated by ivy. There is extreme mature growth on trees, and few plants other than ivy on the ground. See Glossary.

number of individuals, proving that seed dispersal is a major factor in ivy expansion. It also implies that ivy can germinate under a mat of its own vegetation. To test his findings we compared two sites, and the difference in ivy growth through the years.

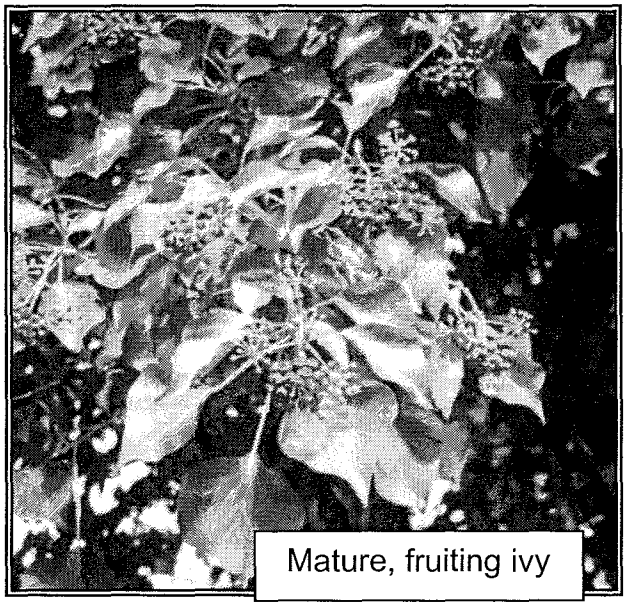
1. Firelane 12: Ivy was removed thoroughly from the site. There were few adjacent seed sources. We returned periodically to monitor for regrowth and found that the ivy remained sparse. The ivy that was growing most likely wasn't from seed given its remote location, and that the vegetative growth was relatively slow.


Ivy sprout in a native plant community

2. Cumberland trail: We stripped the hillside of ivy to create a test plot. The adjacent areas have a great deal of mature, fruiting ivy, and when re-visited had ivy sprouts that weren't the result of vegetative regrowth, but from seed vectoring. Cumberland's ivy has had a much higher rate of growing than that of firelane 12.

F. Priority sites according to monitoring data:

Of the 91 sites monitored 28 sites were considered to be "Priority Sites" or sites that need immediate, focused attention. The top reasons for a "priority" classification:


Mature, fruiting ivy

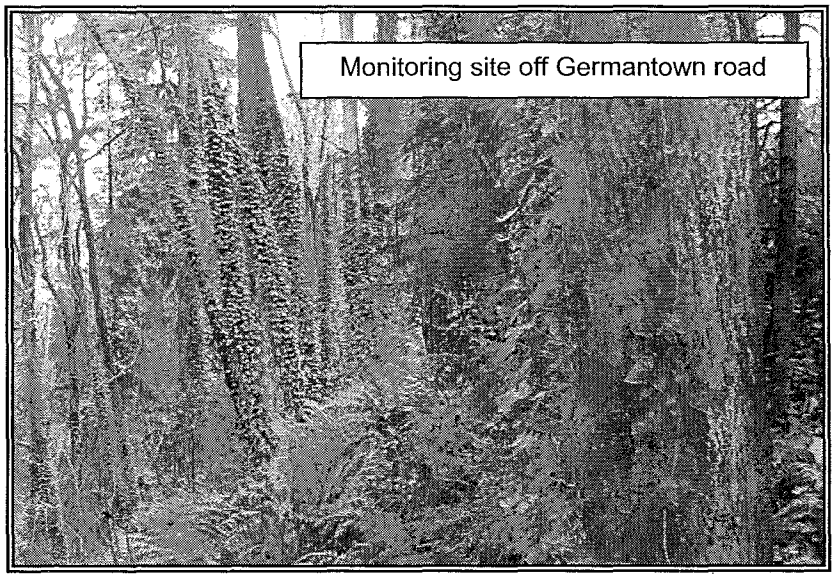
- mature ivy present
- interior isolated patch
- infestation near critical
- mature ivy in nearby areas
- other invasives the predominant problem

Other reasons for a "priority" classification included:

- Current "ivy desert"[10]
- Former/ improving "ivy desert"
- Soon to become ivy desert
- Infestation out of control due to lack of attention
- Formerly a developed site where reclamation efforts are needed
- Area where preventative action can be very effective (not isolated patches)
- Area of heavy infestation very visible to public
- Work suitable for inexperienced volunteers
- Witches brew[11]

G. Improvements to the monitoring process:

The Decennial Monitoring Project was a success, both in assessing the effectiveness of work performed and the environmental education elements of the monitoring process itself. The Monitoring project was not without its setbacks, including issues that arose from data quality. Considering that we had less than 6 weeks to assess over 90 sites in an area as large as Forest Park the data was not always reliable. Institutional archives were used when the data recorded appeared blatantly incorrect or incongruent with the experience of long-time employees. (For example: site location, initial conditions of site, or number of visits to site.) There were a few things that we could have done differently to improve the


Monitoring site off Germantown road

[11] "Witches Brew" is the cohabitation of invasives that occurs after major canopy collapse and along edge invasions. Usually contains Clematis and Himalayan Blackberry. See Glossary and Categories of Infestation Appendix C

process, to obtain clearer results at some work locations, and increase the value of the educational experience.

Plant identification issues:

Many crewmembers had difficulty assessing the habitat health of a particular area because they were not able to identify certain indicator plant species and because they tended to measure effectiveness only in terms of biomass removed, without taking into consideration issues of increased biodiversity. A better orientation would have included a more thorough refresher of native and invasive plants and a stronger emphasis on issues of increased biodiversity and incremental restoration rather than simply biomass reduction of invasive plants.

Worksite documentation issues:

- More exact location information should be added to worksite documentation forms.
- Maps should be included with most site documentation forms to aid in specificity
- Photos should be used more frequently to aid in site identification.
- Additional emphasis needs to be placed on preparation of site documents and on maintaining the archived work site documents in the proper order so that useful information is recorded and can be located when needed.[12]

IV. Conclusions

A. Ivy Removal

The removal methods were developed and refined through years of field experience in Forest Park, whose physical size, varying terrain and forest types offered a wide spectrum of ivy growth patterns. The resulting removal protocol emphasizes habitat reclamation through biomass reduction.

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[12] Note: The quality of work site documentation seems to have decreased since the "short form" site document was developed for return visits to a work site. Consideration should be given to only using the short form when removal activity is more educational in nature as opposed to when performing more concentrated removal and control actions.

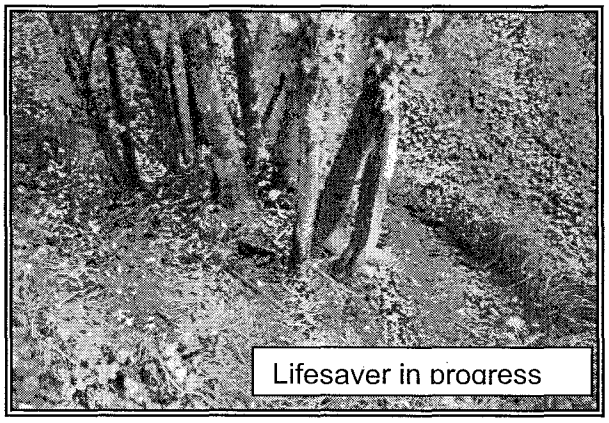
***Key Lesson*: Ivy removal from Forest Park cannot be treated in a formulaic manner.**

Not all ivy infestations are the same. Therefore, strategies for ivy removal will vary given the habitat's characteristics and its connection to human activities. Keeping this in mind, large-scale strategies must be implemented while employing the tactics at hand. Based on ten years of remarkably diverse experience within a living laboratory, these priorities have been identified to controlling ivy's assault:

The Strategy

- **Stop the seeds.**
- **Save the trees and the canopy.**
- **Locate and eliminate new, isolated infestations started from seed.**
- **Reduce ivy biomass where and when possible to control its impact and increase the health of habitats.**

Stop the seeds: To prevent spread of seed and future infestations, the most crucial strategy is to stop propagation. In the case of English Ivy, Clematis, and Himalayan Blackberry it is often more important to stop the seeds than to remove immature vegetation.



Lifesaver in progress

Save the trees: To stop canopy loss, remove ivy from trees. Our preferred method of freeing trees is **the "lifesaver" method.** It is important to complete 'lifesavers' for trees by removing ivy in a six-foot radius around the tree. By doing so, re-growth is retarded for several years while tree work is accomplished in other areas and until more ground removal can take place in that area. Simply removing vines from the trunk assures regrowth in a short time.[13]

Eliminate Isolated Patches: To stop the spread of ivy into areas that were previously ivy-free, concentrate removal efforts on places where ivy has moved into the "core" of the park. Seed dispersal by birds can start ivy in small areas that are detatched from most of the problem, where it can remain hidden from view until it reaches major scale and spreads seed into other areas that were free of ivy.

Reduce Biomass: Once ivy is removed from the trees, ground removal between the lifesavers can take place[14]. Groundpull is usually performed only in this circumstance, or as part of another large-scale strategy. Non-strategic groundpull is ineffective given ivy's tendency to grow over the hole created.[15]. When groundpull is successful, it results in passive restoration and improvements in habitat diversity as soon as the next growing season.

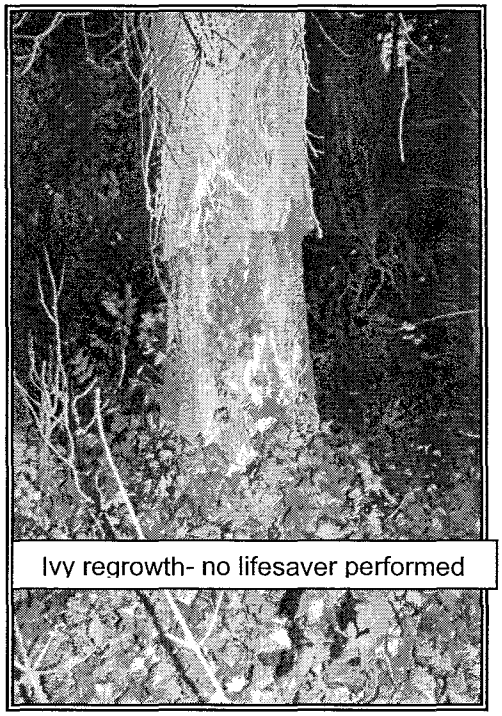
Key Lesson: **Eradication is an unrealistic goal, while increasing biodiversity is practical and possible.**

Maximizing our efforts

- **Complete eradication is the lowest priority.**
- **Focus on specific strategically selected sites**
- **Urban edges and trail systems should be dealt with as special cases**
- **Monitoring is an active process to be performed six months after a major work party**

Complete eradication of ivy is our project's lowest priority. In most cases, this is an impractical goal because, by definition, eradication is the removal of *all vegetative presence*. The removal of 90% of an infestation causes a significant and immediate increase in biodiversity ensuring the viability of the forest ecosystem. It takes as long to remove the final 10% of ivy growth as it does to remove the first

Dead ivy vines clings to a tree surrounded by a renewed native plant community



Ivy regrowth- no lifesaver performed

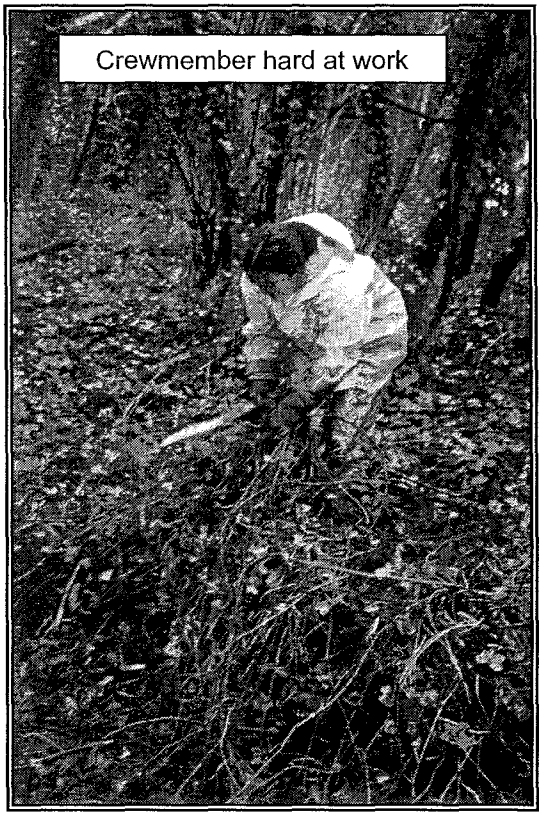
[13] "Lifesaver" method vs. "girdling" See glossary of terms.
[14] "connecting the dots" See glossary of terms.
[15] "Swiss cheese" method, See glossary of terms.

90%, which would be an inefficient use of our limited resources.

***Key Lesson*: Focus on strategically selected sites.** It is better to focus work on a few sites rather than a large number. Initially we spread our efforts out to many areas of the park, and later focused on specific sites. We found the highest rate of native plant recovery was accomplished through frequent, consistent removal of biomass, and systematic targeting of fruiting ivy in adjacent areas.

***Key Lesson*: Urban edges and trail systems are low priority sites.** Ivy removal on urban edges, or trail edges is a poor removal strategy unless there is some immediate active restoration is planned. [16] Edges provide perfect conditions for sun tolerant invasive species to gain footholds.

***Key Lesson:* Monitoring is an active process to be performed six months after a major work party**. After a major removal, the most important monitoring visit should be done six months later because you will catch the largest proportion of missed roots. Unless we are performing a comparative monitoring project (test plots, etc.), monitoring is an active process: a combination of evaluation and follow-up action.


Crewmember hard at work

B. Workforce:

Working with the community

- **Community volunteerism changes societal attitudes.**
- **Training is essential**
- **Small groups have a big impact on ivy infestations.**

***Key Lesson*: Community volunteerism changes societal attitudes.** Community hands-on participation in controlling ivy is essential to developing the cultural values that will produce

[16] See Glossary of Terms

the attitudes and behaviors essential for a sustained effort akin to that required for recycling.

***Key Lesson*: Training is essential.** From our anecdotal experience well-trained crew members and volunteers perform work in a shorter amount of time and have the ability to work in a wider variety of conditions, such as areas of high quality habitat and low ivy density.

***Key Lesson*: Small groups have a big impact on ivy infestations.** Small groups returning to the same site time after time accomplish the highest quality work. In this way volunteers feel connected to a region of the park and are motivated by the passive restoration that occurs. It is best to use these crews in priority areas that low accessibility prevents us from visiting with frequency. It is best if these crews are made up of adult and stronger volunteers are needed for removal in more difficult terrain.

Conclusions:

The Strategy

- **Stop the seeds.**
- **Save the trees and the canopy.**
- **Locate and eliminate new, isolated infestations started from seed.**
- **Reduce ivy biomass where and when possible to control its impact and increase the health of habitats.**

Maximizing our efforts

- **Complete eradication is the lowest priority.**
- **Focus on specific strategically selected sites**
- **Urban edges and trail systems should be dealt with as special cases**
- **Monitoring is an active process to be performed six months after a major work party**

Working with the community

- **Community volunteerism changes societal attitudes.**
- **Training is essential**
- **Small groups have a big impact on ivy infestations.**

V. Looking Forward: The Next Ten Years

Most of the "key lessons" in the previous section summarize the things that we have learned in our efforts to protect Forest Park, but Forest Park is not the same as any typical ivy infestation that will be found in other areas. Instead, it has an enormous diversity of infestation situations that can function as a dynamic laboratory for developing different removal tactics and measuring their impacts. In many ways, the Ivy Removal Project has served a similar function, by allowing us to observe and experiment with the "human side of the equation" in ivy removal.

In the first few years, our efforts focused on learning the best tactics for removing ivy at any given site, and the best ways to use the workforce that was available at that site. Over time, we also began to think about our work as part of a broader effort that involved not just the 5,000 acres in Forest Park but the region as a whole. In particular, we realized that even if we eradicated every single ivy vine in Forest Park, the problem would not go away because new ivy seed would enter the park and restart the cycle of infestation.

Through our decade of experience, we have moved beyond the kind of site-specific thinking that asks "how can we remove this patch of ivy" to a broader perspective that asks: "How can we control the spread ivy and other invasive plants throughout this region?" Our thoughts about the human side of the equation have also evolved, from a focus on matching specific groups of volunteers with specific sites, to an emphasis on environmental education and community partnerships that address the broader problem. In many ways, the largest lesson we have learned is that the kind of thinking that we need to do at the local level, to protect a particular natural area, is quite different from the thinking that we need to do at the regional level, which is where we must act if we are ever going to control ivy and other invasive species.

One major element in that shift in thinking is a moving away from "eradication" and towards "control" of ivy. While it is possible to eradicate ivy at any give site, it requires an intense amount of effort that is almost always an inefficient use of resources. Worse yet, most eradication efforts are not only inefficient but ineffective as well, because the same seed dispersal process that created the infestation at that site

will simply restart the problem in areas that were supposedly "cleared." Once we view the problem from an ecosystem perspective, rather than thinking on a site-by-site basis, it is obvious that fences and property lines have little or no effect on the spread of ivy by seed. Hence, any effort to eradicate ivy on the ground is futile without first controlling seed production and dispersal.

> ***Key Priority*: Control the spread of ivy into both new and previously cleared areas by emphasizing the elimination of seed production. Match these removal activities with aggressive public education efforts because much of this seed source is on private property.**

Another major shift in our thinking has been the move away from an exclusive emphasis on Forest Park and toward the realization that ivy control is problem that requires efforts throughout Portland and the Northwest. Controlling the spread of ivy and other invasive plants is such a large-scale problem that its beyond scope that any one group can address, even on its own property. Instead, we must develop alliances and partnerships that address problem both on a local and a regional basis. Our long-term success depends on the ability of multiple partners to cooperate and collaborate.

At the same time, however, we must address the potential for people being either overwhelmed by the enormity of the problem or overly optimistic about a silver bullet that will make the problem go away. The people who work with us need to understand that this not a problem that will be solved any time soon. Education and motivation are essential tools to avoid people becoming overwhelmed or overly optimistic.

> ***Key Priority*: Create partnerships at both the local and regional level to work together on controlling the spread of ivy and other invasive plants. Use our combined efforts not just to increase removal efforts but also to educate and motivate the public.**

Research is another obvious priority as we maximize both the effectiveness and the efficiency of our work. We have learned a great deal about removing ivy and other

invasive plants during the past decade, but we are increasingly aware of how much more we need to know. Like our coordinated removal efforts, this research will require collaborative efforts. In this case, those collaborations must reach beyond the regional level, and the Ivy Removal Project is already taking a highly visible role in national and international efforts to promote such research.

Another lesson from our experience is that ivy and invasive plants are not just a technical problem that focuses on removal efforts. Instead, this is also a problem that has both cultural and policy dimensions. At the cultural level, we need to change the public's attitudes and behaviors with regard to invasive species. Those cultural changes are, in turn, crucial to creating changes in local, state, and national policies with regard to invasive species. Ultimately, we cannot succeed unless we have policy changes that not only promote the removal of invasives but also prevent their further spread and promote essential research.

Educating the public is an essential step towards promoting research, changing cultural assumptions, and influencing policy, and English ivy plays a special role in these education efforts. The visibility of ivy as a problem in the Pacific Northwest engages the public in noxious weed and invasive species issues in our region, just as kudzu in other parts of the U.S. The public must understand how bad the problem is before it will support the actions needed to keep this threat from becoming even worse.

Partnerships and collaboration are absolutely essential for pursuing the broader goals associated with research, culture, policy, and education. Our project is rightfully proud of what we have accomplished in this regard during the past decade, but we are also humbled by the immense task that lies ahead.

> ***Key Priority*: Create partnerships with regard to invasive species at the state, national, and international level to promote research, change cultural values, influence policy, and educate the public.**

In summary, our long-term success depends on the ability of multiple partners to collaborate, not only in our removal efforts but also in our work with the public and policy

makers. Our biggest goal for the next decade must be to pursue our objectives in a way that is truly sustainable. We need to institutionalize our programs, so that our human resources will be equal to the magnitude of the challenge we face from ivy and other invasive plants.

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VIII. Appendices

A. Map of monitoring-site locations and list of monitoring sites
B. Species referred to in report and Glossary of Terms
C. Categories of Ivy Infestation
D. Map of Reach Locations and Reach Comparison Charts
E. Knowing the Enemy; A Botanical and Ecological Profile of Hedera helix L. (English ivy). Additional research ideas available on website.
F. Sample monitoring database entry (printed version of each site available upon request)
G. Characteristics of Priority Sites and 5-Year-Monitoring Candidate Sites
H. Initial Site Document
I. Revised Site Document
J. Short-form Site Document
K. Inventory Form
L. Monitoring Form