

Invasive Species on the Lewis & Clark College Campus

Compiled by Micah Leinbach

Spring 2013

Throughout March and April of the 2013 Spring Semester, I documented invasive species presence on the Lewis & Clark College Campus. The following report is the product of that work. Included are several maps compiled by ArcGIS that show the location of English Ivy and Himalayan Blackberry, as well as directions for anyone who wants access to those files on the Lewis & Clark College GIS server. I include a general overview of invasive presence on campus, followed by an analysis of each plot, organized by Graduate, Law, and College of Arts and Sciences campuses. I close with several remarks on potential strategies for invasive removal.

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BACKGROUND

This project was launched to begin efforts to address Salmon Safe certification of Lewis & Clark College. Salmon Safe is an “eco-label” that certifies an institution, company, or business operates in ways that are conducive to watershed health and salmon conservation efforts. An independent 501(c)3, it was originally founded by the Pacific Rivers Council and maintains a strong emphasis on watershed health. As such, the certification required a review of storm water management, habitat restoration, and pesticide uses on campus.

Following assessment, Salmon Safe asked that Lewis & Clark meet several conditions to reach certification. This report centers on the following:

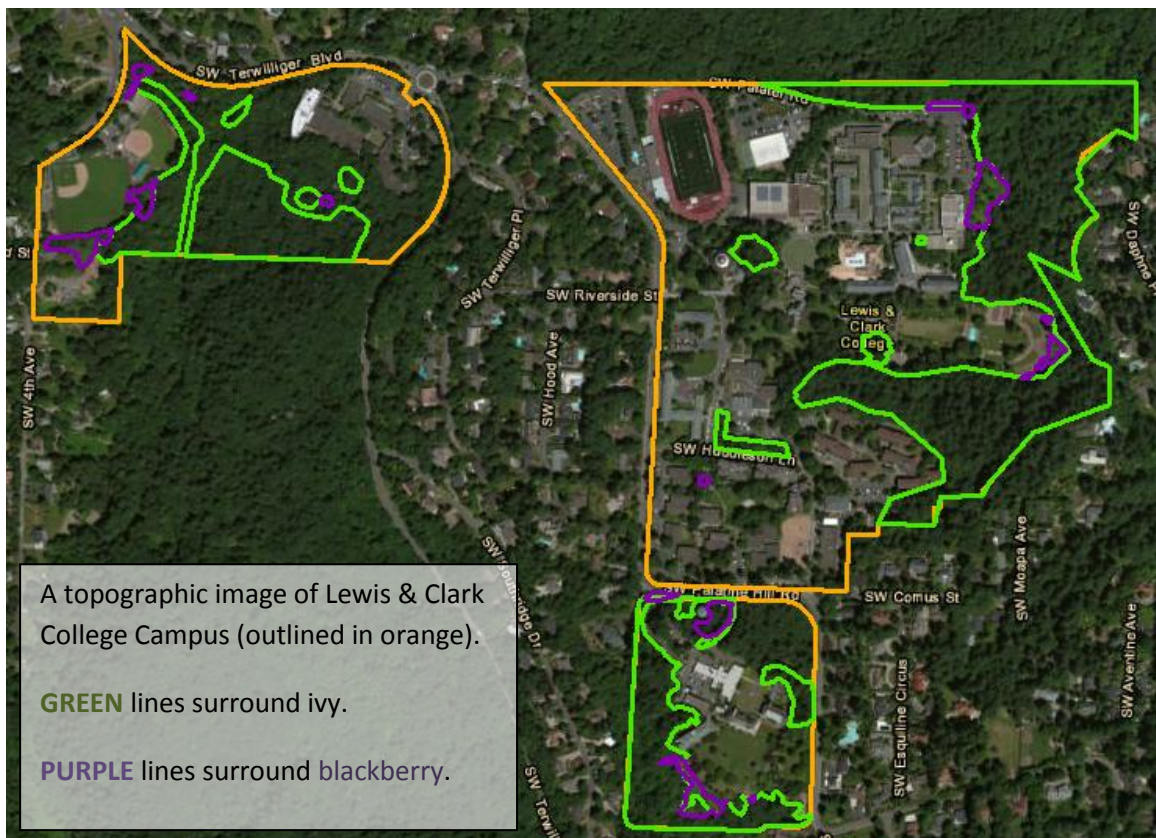
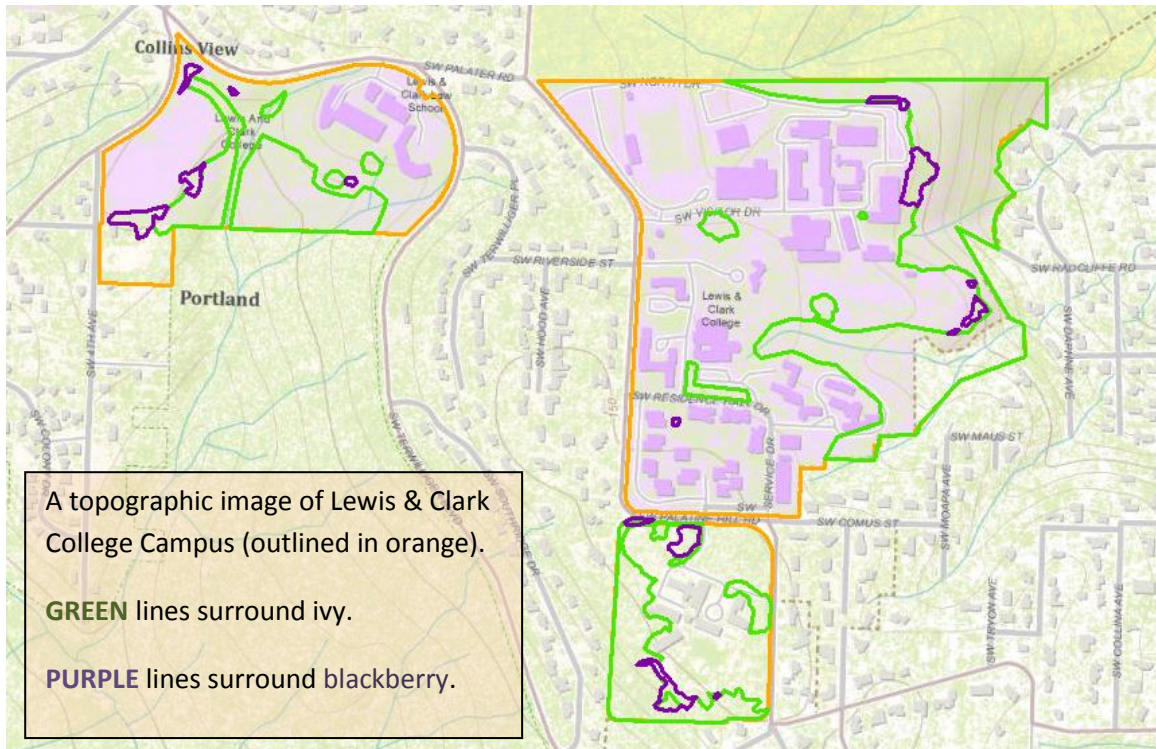
"Lewis and Clark shall prepare and implement a riparian restoration plan for the forested stream ravines on campus. The plan shall provide a comprehensive strategy for controlling non-native plants, particularly english ivy and holly. The assessment team recommends involving students in inventory mapping, prioritizing areas, and actual removal projects."

In order to facilitate this riparian restoration plan, an understanding of the location of invasive species in question was undertaken by Micah Leinbach ('14) in his work for the Sustainability and Grounds Departments in the L&C Facilities Office using methods described in section III (“Methods”).

OVERVIEW

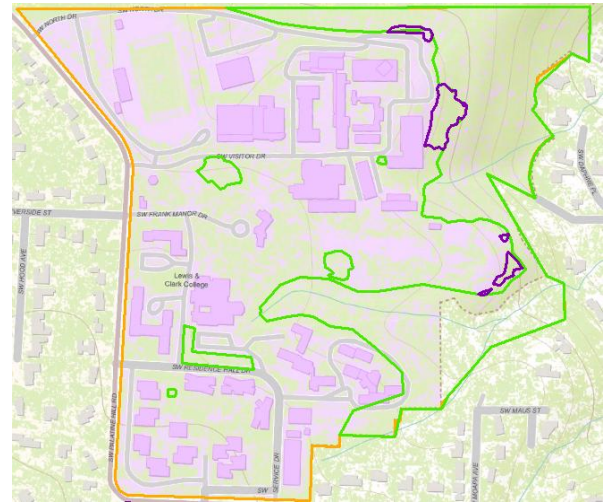
Himalayan Blackberry and English Ivy were emphasized due to their prevalence. The locations of individual English Holly plants were not recorded due to their infrequency. English Holly appears to be regularly distributed within Ivy-infested forests, and generally fails to appear on steeper slopes. Ivy can be found in almost any expansive patch of shaded forest on campus, whereas blackberry patches form smaller clumps around forest edges and in sunny patches. These trends are consistent across campus, though exceptions will be noted in section II (“Results”).

English Ivy remains the most significant invasive plant on campus, covering an approximate total of 39 acres of the campuses 140. Himalayan blackberry patches are significantly less prevalent, covering only 2.8 acres. There are occasions where the two overlap, with English Ivy serving as a groundcover underneath shrubs of Himalayan Blackberry. These places are indicated on the maps below, where species are mapped independently (i.e. in some places, purple and green segments are overlapped).



RESULTS

College of Arts and Sciences



English Ivy

Ivy was recorded throughout the CAS campus. It is possible that small patches, especially under hedges or other shading landscaping, are not identified on the map above. In general, these small patches are isolated from any other patches and do not seem to be at risk for spreading. Some of these patches can be seen above. Examples include the "L" shaped hillside around the Templeton Parking lot and the isolated patch on the west end of Olin.

Ivy appears to be spreading into newer landscaping in the area northeast of the chapel. Patches here are small and isolated, likely due to clearing in the area and landscaping associated with the construction of the Gregg Pavilion. These patches are not fully captured by the image above. There is still ample groundcover where ivy has not taken over, though it may be short lived.

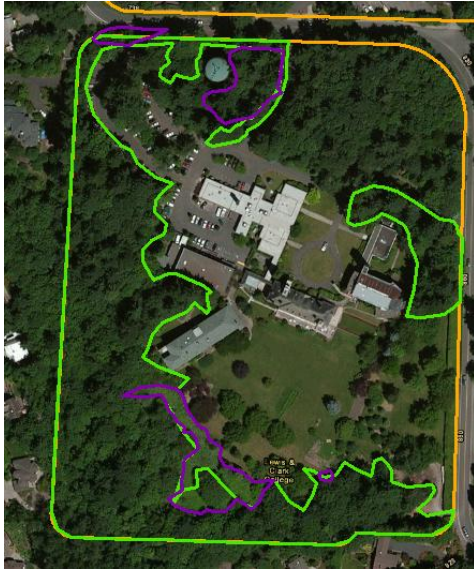
Ivy is dense and well-established throughout the ravine, around the rose garden, and into the entire northeast corner of the CAS estate. This was the thickest, most established ivy located throughout the project. It covers 22.8 acres, or 58 % of all ivy coverage. It is as continuous as the image above indicates.

Pictures of these areas are provided at the end of this document.

Himalayan Blackberry

Himalayan blackberry is less common on the CAS campus than elsewhere. Significant patches are identified above. The largest patches are found east of Olin or east of the Rose Garden in full sun. Occasional individual plants can be found throughout the ravine, but these are rare and seem unlikely to spread dramatically.

Graduate School of Education and Counseling



English Ivy

Ivy is thick and well established in almost all of the above highlighted areas.

The main exception to this is surrounding the water tower. Here, ivy is often found as groundcover underneath blackberry or other plants. It runs along the road leading to the Graduate Campus, approximately two meters from the road. This patch has a limited width, as seen in the picture above, before it becomes blackberry patch.

Due to landscaping following the addition of a parking lot, the northeast corner of campus is free of any significant invasive presence. However, **ivy is encroaching from the road to the east and could readily spread into this area.**

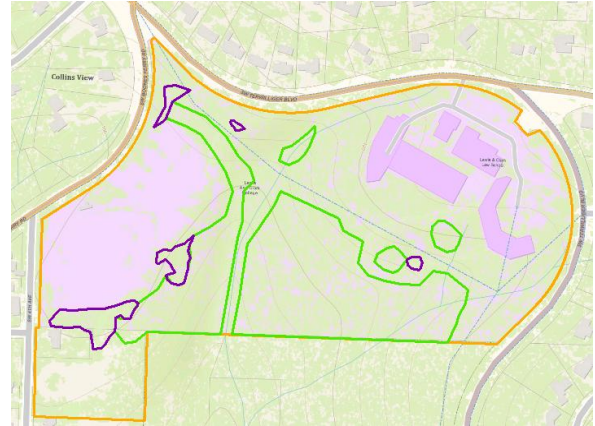
Ivy is present in the southeast corner near the South Campus Student Garden. It is more intermittent and sparse. It appears to decline when shaded by rhododendron – close to rhododendron trunks there was almost no ivy at all.

Pictures of these areas are provided at the end of this document.

Himalayan Blackberry

Himalayan blackberry is very common on the Graduate campus. The patch surrounding the water tower is large, but navigable and rarely reaches more than a few feet off the ground. The patch to the south of the Corbett Lawn is thick, expansive, and often difficult to impossible to navigate. This patch is consistent. Some ivy may be present here, but could not be reached. It appears on the trunks of trees.

Law School



English Ivy

Ivy presence is diverse on the Law School Campus.

In the large patches on the southern portion of the Law Campus (bordering Tryon State Park) ivy appears thick and well developed throughout. There are few trails or points of access here, and steep ravines make it difficult to navigate. Ivy is absent only in the steepest sections, or immediately along streams (presumably due to flooding impacts).

Along the bike path on the north end of the Law Campus, Ivy is prevalent clinging to individual trees. As a ground cover it is relatively rare, appearing in only a few small patches along the path – the largest of these are identified above. These may be places where ivy is likely to spread. 5-6 meters south of the path it begins to appear more frequently, forming the large patches described above.

Pictures of these areas are provided at the end of this document.

Himalayan Blackberry

Himalayan blackberry is prevalent in very small patches along the side of the road and bike path, presumably due to the increase in sun due to proximity to open pavement. Larger patches were marked alongside the path.

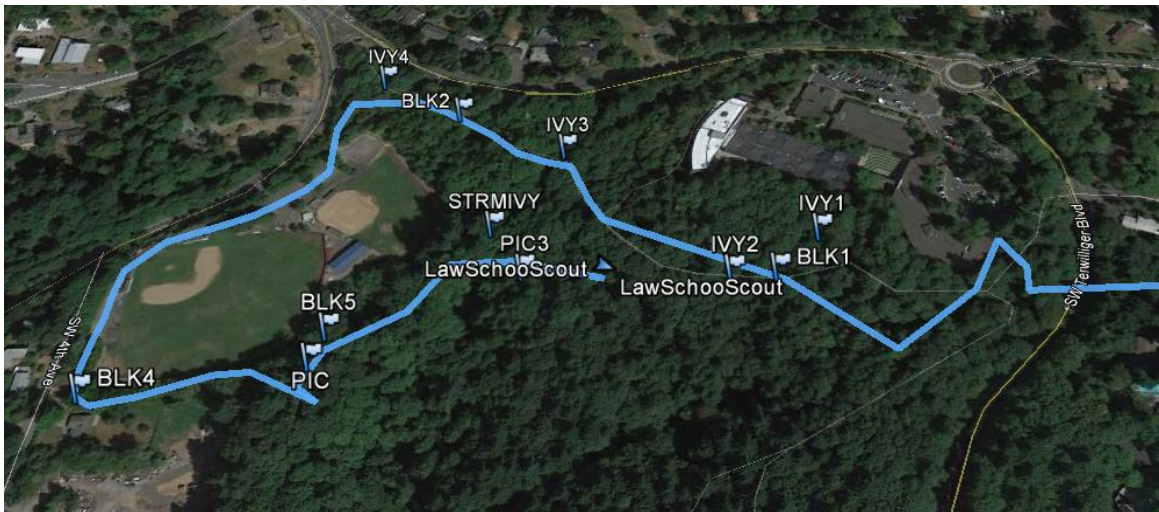
The largest blackberry patches on the Law School occur around open spaces in the Huston Sports Arena. One large patch occurs at the north entrance to Huston, coming off the bike path.

METHODS

SURVEYING

Surveying took place over the course of multiple days throughout March, April, and May. Equipped with a GPS and camera, I would visually assess the portion of campus I was interested and sketch out the distribution of invasive patches. I was generally interested in larger patches that were part of contiguous non-paved surfaces. I emphasized focus on regions that connect to streams and riparian zones, especially on the Law and CAS campus. Some invasive species can be found in small lawn or pavement bound areas that seem to offer minimal concern – a good example is a small patch of ivy found under the bushes near the Juniper student garden.

In general, I did this surveying alone. The one exception was when I would be far enough from a path or trail that I could not call for help if needed. Sarah Clement ('14) assisted at that point, traveling with me through some of the less developed parts of campus. Other students offered assistance and some directed me towards particular plots of invasive species, but their assistance was limited.



The above image is an example of what a “survey trip” might look like. I tracked routes with GPS and identified places where I saw English Ivy or Blackberry. I also tracked locations where I took pictures, which can be found at the end of this document. This data was compiled into ArcGIS.

ArcGIS

I used the Lewis & Clark ArcGIS server throughout this project. The server allows for anyone to access the ArcGIS program using their LC account. This can be done while on the Lewis & Clark wireless or through our “VPN” remote access server. Information on the VPN can be found on the IT website, or you can simply log-in and download the VPN program at: <https://vpn.lclark.edu/>.

I have set up a folder and data files for use by facilities in the GIS server. Instructions for access are included in Appendix A. In addition to data for Salmon Safe, I have included files relating to other dimensions of campus planning, including campus boundaries, parking areas, roads and sidewalks, lamp posts, and others. Given the ability of GIS to carry out spatial data analysis (area, perimeter, etc... calculations) and to host other varieties of data, this will be a useful source for other projects. For example, it is within reason to use GIS to geolocate storm water outflows and determine where the watershed is for any given on-campus stream.

ArcGIS can be converted into a more accessible format to be shared online using the website Geocommons. This allows for data and information to be shared more broadly (i.e. on websites, public communications, etc...) in a way that is engaging and interactive. That could merit a further project.

COMPILING

A map was established with both a topographic and aerial image “base map.” Campus boundaries (orange lines, in the above photos) were established to guide the analysis. GPS data was downloaded into Google Earth and saved as a .KML file, then converted into .LYR (layer) files compatible with ArcGIS. This was done using the “Conversion Toolbox” available in ArcGIS. GPS data allowed records of survey tracks, roads that were not visible on base maps, and the edges of invasive species plot to have visual representation.

Two polygon .SHP (“shape”) files were created, one for Himalayan Blackberry (purple) and one for English Ivy (green). Using an editing tool and aerial photos of campus large tracts of invasive species were drawn onto the map. These were cross-referenced with photos to identify areas that were blocked from aerial imagery due to tree canopy cover, and reflect the notes taken while I was in the field. Patches are generally represented by circles surrounding a GPS point “flagged” at the edge of the patch – examples of these flags can be seen in the photo of my GPS track above, and you can see in the law school images how those carried over into GIS.

CONCLUSION

Very little research has been done on the presence of invasive English Ivy and Himalayan Blackberry in the Pacific Northwest, especially as it relates to riparian zone health. Its impact is visually stunning, but the given the limited time of study it is difficult to analyze ecological impacts. A study by Dr. Katrina Dlugosch in 2005 suggested that in urban parks in Seattle impacts of ivy invasion were negligible in terms of species richness and diversity. There appeared to be an increase in tree seedling recruitment in invaded areas, whereas shrubs and other ground cover declined when invaded (Dlugosch 2005). The impacts of these changes on riparian zone health remain unclear.

Salmon Safe suggests restoration of riparian zones on campus, a suggestion that seems in line with the values of the Lewis & Clark Facilities Office and campus as a whole. If actions are taken, it might be wise to first approach and clear out plots that threaten areas that have yet to be invaded. For example, ivy plots along the road to the east of the new parking area on the graduate campus and those surrounding the chapel both threaten new ivy-free landscaping, and might merit more immediate action.

An analysis of the topographic maps (above) suggests that the CAS ravine, northeast corner of the CAS campus, and law school campus should be prioritized areas. These are the only places where an active source of flowing water is recorded on the maps. These are also the places where ivy is thickest and most well-established. Any removal plan should take into account the potential erosion that could take place when ivy is stripped. As the primary groundcover in those areas, it may play a key role in maintaining stream banks and reducing erosion, and would need an immediate replacement before native species could recruit to play a similar role.

There is no question that removal of invasive species will involve a long-term project, hours of work, and significant investment. Prioritizing the above areas should bring Lewis & Clark College in-line with the Salmon Safe requirements while also ensuring that areas currently free of ivy can be maintained that way.

Questions regarding this report can be sent to mleinbach@lclark.edu.

WORKS CITED

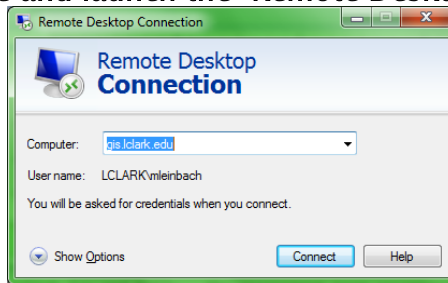
Dlugosch, K M. (2005). Understory community changes associated with English ivy invasions in Seattle's urban parks. UC Santa Cruz: Retrieved from: <http://escholarship.org/uc/item/6sv7f3fc>

APPENDIX A

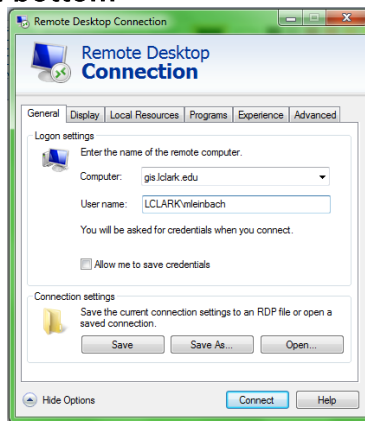
TO ACCESS FACILITIES FILES ON THE LEWIS & CLARK GIS SERVER

For context, you are about to access a computer on-campus that has ArcGIS installed. You will log in as yourself (i.e. under your Lewis & Clark Account) and will then be able to utilize all the resources of ArcGIS, as well as share your files with anyone else at the school.

1. On your computer locate and launch the "Remote Desktop Connection" program



2. Select "Show Options" at bottom



3. Under "Computer" enter: "gis.lclark.edu"
4. Under username, enter your Lewis & Clark log-in in the following format:
LCLARK/yourlogin
5. Click "Connect"
6. You will be asked to "Enter Your Credentials" – enter your Lewis & Clark password
7. Your computer will tell you that the identity of the remote computer cannot be identified. Confirm that you do want access.
8. Welcome to the GIS server!

The GIS server is an old-school PC, and it can run pretty slow sometimes. This is especially true when lots of people are on it. On the D:/ drive, you will find two folders: GIS_DATA and GIS_USERS. Avoid use of the GIS_DATA folder unless you know what you need.

In GIS_USERS you will see folders for all of the users of this program. A few individuals have their own folders (generally the first letter of their first name and the last letter of their first name). You can also find a FACILITIES folder, where facilities projects are being stored.

You are welcome to add folders as needed, but please try and keep things clean – this is shared digital space. And word to the wise, NEVER USE A SPACE IN A GIS FILE NAME. It will shut down the ArcGIS if you ever use that folder through the program.

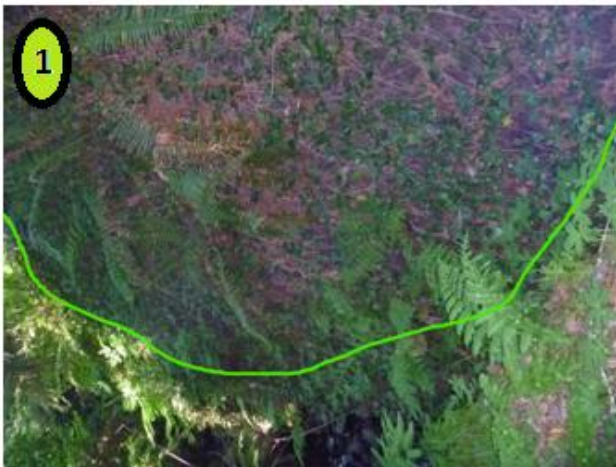
You can launch ArcGIS from the start bar. Enjoy!

APPENDIX B

Photos and commentary on specific sites.
Ivy is highlighted in green. Blackberry is highlighted in purple.

Law - Ravine

In the law school ravine ivy is present but neither thick nor dense. It occurs on steep slopes immediately up to the stream (as in top and bottom left). The top right photo shows ivy as located along the slope leading up to the bike path at the law school. The bike path runs along the part of the photo (center top) where you can see more sun.



Law - Bike Path

The bike path provides the best perspective on the law school campus as a whole, showing its general “patchiness” and lack of major plots. This does not apply to the Law School ravine and southern edge of the campus described above.

In image 1 you see the typical community structure along the street or bike path – namely, ivy immediately adjacent to the path with patches of blackberry behind. Image 2 shows a blackberry patch (in typical size). Image 3 shows the beginning the widespread ivy of the ravine, a few meters back from the path. Image 4 shows the appearance of the forest north of the bike path, where ivy is not seen as ground cover but is colonizing many of the trees. You can see the Boley Law Library in the background of that image.

English Holly is scattered but present along the bike path.



Law - Huston Fields

The most relevant invasive species surrounding Huston are large blackberry patches. Here they can be seen surrounding the baseball diamond. Image 1 is immediately south of the baseball diamond, image 2 is immediately east of the diamond looking up towards it.

Images of the surrounding area are best seen in the “Law School Ravine” section.



CAS – Rose Garden

Rose Garden blackberry patches occur on a steep, sunny slope but are less expansive than others on campus.



CAS – Chapel

The chapel is largely free of invasives, but sizable patches of English Ivy are encroaching on newly landscaped space and ivy-free areas.



CAS – North East Corner

The area around Olin, north of the rose garden, and around the Fir Acres parking lot is consistently covered in dense ivy, as in Image 1. You can see in image 2 how quickly this ivy shifts to non-ivy along the Riverview boundary. The Fir Acres parking lot is bordered by thick blackberry stands. There is some English Holly present in this area.



GRAD – Corbett Lawn

Image 1 shows the large blackberry patch visible to the south of the Corbett Lawn. This patch also hosts ivy, both as ground cover (though it is hard to access due to thorns) and on trees, as seen in Image 2, which was taken in the center of the patch. Image 1 and 2 come from the same area, pointing in different directions. Image 1 faces up towards Roger's Hall, which can be seen in the upper right corner of the frame. Image 3 shows the beginning of the blackberry patch, and was taken along the southern corner of Roger's Hall.



GRAD – Roadside and Water tower

Images 1 and 2 show the presence of ivy alongside the road into the graduate campus and along Palatine Hill Road. This ivy borders various segmented patches of blackberry underneath and around the water tower, as seen in image 1. Ivy is most dense along the outside edge, and is a scarcer ground cover deeper into the thicket.

Image 3, along Palatine Hill Road east of the graduate campus, shows ivy encroachment onto the new landscaping near the new parking area.



GRAD – Southwest Corner

These images come from the old nun's path that passes around Sequoia and in back of Roger's Hall. Ivy here is thick and well established, both as ground cover and as trees. English Holly is also common in this area, and any removal here could easily include the removal of those plants as well. Image 1 is looking up to Sequoia from the path. Most of these images come from roughly the same point, with one looking up the path and the other looking down slope.

