

Executive Summary

Colby-Sawyer College: Landscape Management Research

Introduction

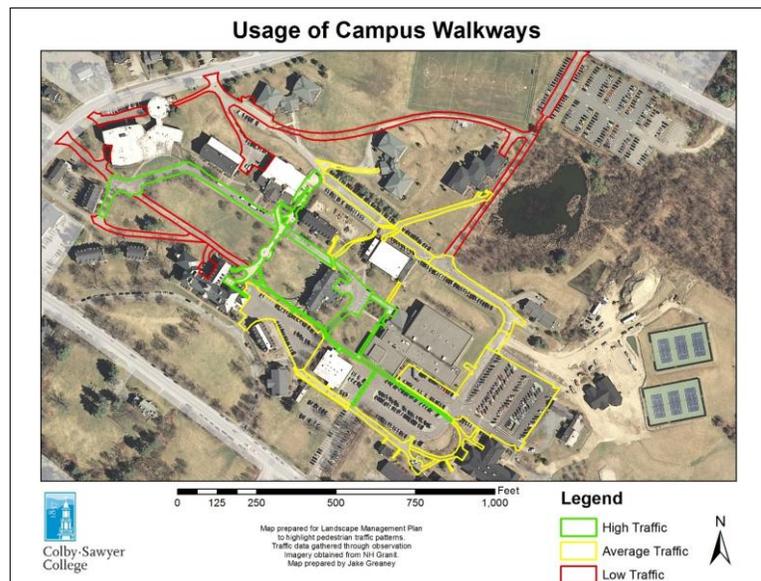
A Landscape Management Plan is a document that outlines goals and steps for the strategic long term management of a property. Colby-Sawyer College is looking for a long term plan to develop its campus landscape, and the 2015-2016 Community Based Research Project group is working with Colby-Sawyer to create a landscape management plan for the college. No such plan is currently in place at the college. The objective of this document is to compile and analyze all data gathered throughout the semester. Our research will be used to make informed design decisions in the spring of 2016.

Stakeholders & Culture

In order to fully understand the needs of the Colby-Sawyer community, we took steps to identify each group of stakeholders involved in the development of a landscape management plan. To understand these interests, our team conducted a series of outreach events and community observations.

To begin, we created a map of stakeholders and identified the primary interests of three core groups: the college community, the New London community, and the environment. Using a Venn diagram, we established both the shared and contrasting interests among stakeholders. We found that the common interests across all stakeholder groups are to uphold best practices for water management and to strive for sustainability.

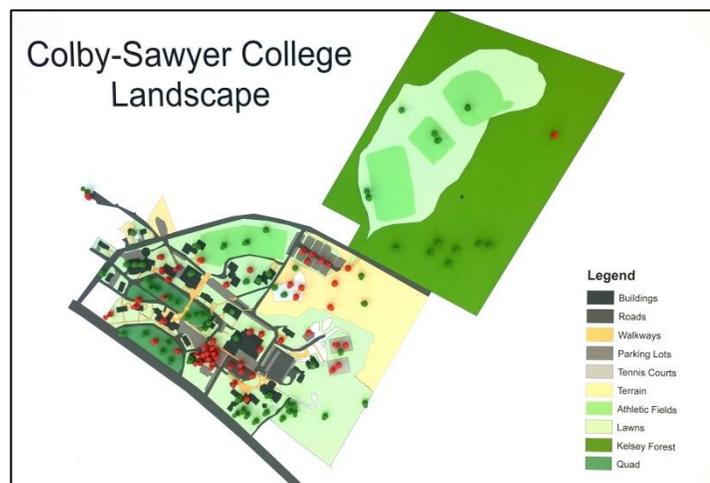
We interviewed three individuals who are directly involved in the development and management of the college's landscape. These individuals are President Tom Galligan, Vice President for Student Development and Dean of Students Dave Sauerwein, and Senior Director of Facilities Robert Vachon. We coded the transcripts of each of these interviews and identified every statement addressing the key themes of: academics, aesthetics,



culture, economics, environment, and management. We found that the dialogue from these interviews focused on establishing a brand and sense of place within the landscape, implementing sustainable initiatives, and improving ease of maintenance.

Next, we focused on identifying how individuals interact with the landscape. The first component of this was researching current foot traffic patterns. To do so, we conducted an outreach event where we asked fifty individuals in the dining hall to draw their daily routes on a basic map of campus. To test these responses, we held an observation period from 7:45 to 9:45 a.m. on a Tuesday and counted each individual who walked by one of five locations on campus. We found that the highest trafficked areas are concentrated in the center of campus, while the low trafficked areas are on the outskirts of campus.

To study the aesthetic preferences of our campus landscape, we held two events in which we presented individuals in the dining hall with a map of the campus. We asked them to place green tacks in areas they preferred and red tacks in areas they found needed improvement. The two events yielded a total of 279 responses. Responses showed us that individuals prefer lawns and areas that have mountain views, but find parking lots and buildings such as Reichold Center and the Sawyer Fine Arts Center less appealing.



To gather an understanding of existing perceptions, human patterns, and aesthetic preferences regarding Colby-Sawyer's landscape, we developed two surveys, one for students and the second for faculty and staff. These surveys asked participants to rank landscape features based on aesthetic preferences and to indicate ways they use the landscape. Responses showed that the quad and the permaculture gardens are the most used areas on campus, whereas the athletic fields and Kelsey Forest are the least used. However, respondents indicated interest in a broad range of outdoor activities, showing the need for a diverse landscape.

Our next step was to tour the college as a prospective student would. Our class broke into two tour groups and identified viewsheds, poorly maintained areas, learning opportunities, and the overall cultural expression. We found that many learning opportunities were sustainable initiatives such as the Sun Shack and were largely located in areas near the library. To gain insight into the landscape practices of other colleges, we also toured Hampshire College in Amherst, Massachusetts. We found multiple initiatives that could be beneficial at Colby-Sawyer, including their meadowlands project, farming operation, and reduction of vehicular traffic.

Lastly, to include the community in the process of creating a landscape management plan, we held an open-forum discussion. We asked attendees to present any comments, questions, or concerns they had regarding this project. The key topics that arose were interests in improving maintenance of Kelsey Forest and Susan Swamp as well as promoting safety and diversity within the landscape.

Landscape Practices

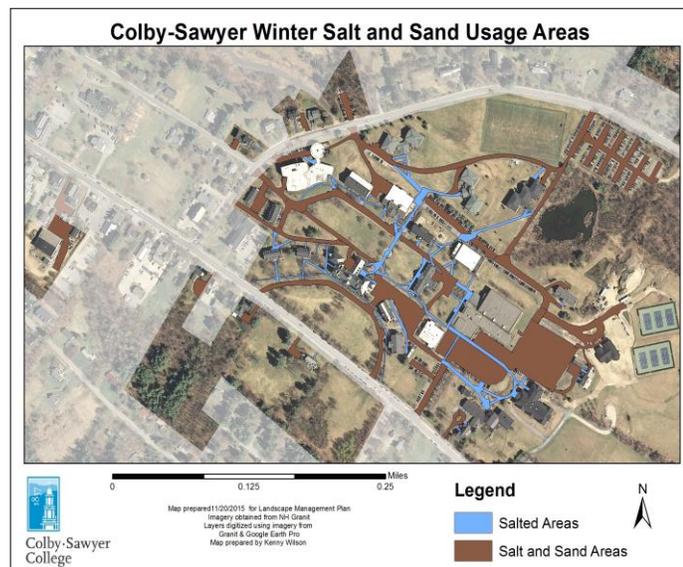
Fertilizer and its impact on a landscape was one of the aspects of our research. Our group found a relationship between inorganic and organic fertilizer used on campus. During 2015, 21,300 pounds (\$7,668) of organic fertilizers and 4,870 pounds (\$2,532) of inorganic fertilizer were used. In 2010, Colby-Sawyer used twice as much inorganic as organic fertilizers. The total cost per acre for fertilizer is about \$186. This quantity and combination of fertilizer use produces 14,000 pounds of Carbon Dioxide equivalent annually.

Gasoline usage is also an important factor in the maintenance of our landscape. There are four major ways gasoline is used in the campus maintenance: lawn maintenance, athletic surface maintenance, pathway maintenance, and roadway and parking maintenance. We calculated the total area, gas consumption, and cost of each usage type. Last year Colby-Sawyer used 4,340 gallons of gas with a total cost of \$10,069. This cost makes up only 4.18% of the total cost to maintain the landscape. Accounting for the equipment used it costs about \$151 dollars in gas per acre.

Labor is another important aspect of landscape management. Labor costs are \$204,000 annually, which is 75% of the total costs of landscape maintenance. The categories that make up the combined labor cost include: spring and fall cleanup, snow removal, flower beds maintenance, athletic field maintenance, equipment servicing, and drain repair. Of these, snow removal is the most expensive at 57% of total labor costs. Additionally, \$21,000 is spent on labor to maintain the lawns, including mowing and clean up.

We also compared annual mulch purchases with production on campus mulch materials. The college pays about \$4,000 for 125 cubic yards of mulch. Fall clean up and mowing on campus produces 646.8 cubic yards of leaf litter.

We looked at sand and salt usage on campus as well. There are three types of salt used on campus: Green Magnum, Blue Lightning, and a 20:80 salt and sand mixture. All of these materials came to a total cost of \$37,065 in 2014/15. We created a GIS map showing the



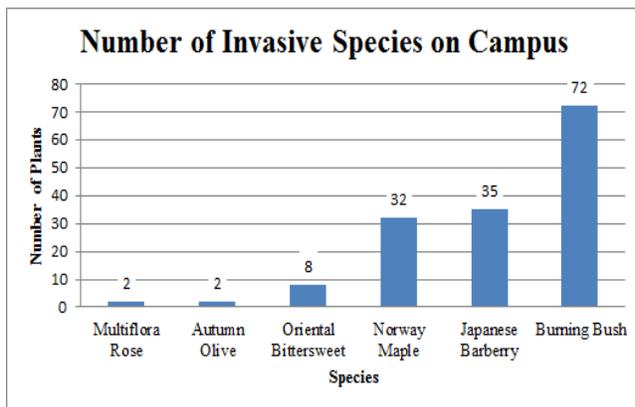
locations where each type of salt is used and researched the negative impacts salt has on soil and water.

We compiled an overview of the different types of lighting on campus and the pros and cons of each. We found that there are three types of lighting on campus: fluorescent, incandescent, and LED. Out of the three types of lighting on campus, 74% of the fixtures are downward facing LED lights.

We inventoried and analyzed the seating options on campus. The location and type of each outdoor seating option on campus was included in the inventory. We identified four primary types of seating: granite benches, wooden benches, picnic tables, and Adirondack chairs. The most prevalent are granite benches, which total fifteen.

There are a total of thirteen parking lots on campus that we examined. Three of those we found to be in below average condition, with cracks and bumps common throughout. Similarly, road continuity speaks to the consistency of surfaces on campus and how they all link together. Types of surfaces found on campus are concrete, asphalt, pavers, stone and concrete mix, as well as two different dirt or gravel surfaces. Four vehicular entrances to campus were noted, none of which had any formal institutional identity.

A tree inventory was done for the college in 2010 by Bartlett Tree Experts, which we examined as part of our research. The plan catalogued every tree on upper campus and detailed numerous parameters for each tree. There are 464 trees and forty-eight different species on campus in varying degrees of health. Of these, more than half of the trees were rated as "mature."



We conducted an invasive species inventory and collected data on the impacts of invasive species and which species are most abundant on campus. Invasive species found on campus are Oriental Bittersweet, Multiflora Rose, Japanese Barberry, Burning Bush, Autumn Olive, Norway Maple, Japanese Knotweed, and Purple Loosestrife. The most abundant of these found on campus is Burning Bush, with a total of seventy-two plants.

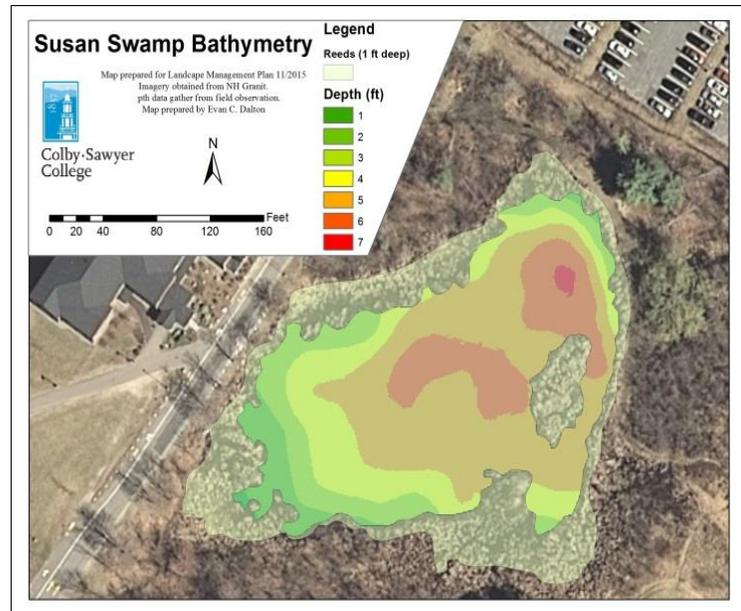
Water Management

Climate is an important part of the landscape, as it includes factors such as temperature, wind patterns and notably, precipitation patterns. Although local temperatures fluctuate naturally, over the past fifty years the average global temperature has increased at the fastest rate in recorded history. Annually, Colby-Sawyer receives about 47.3 inches of rainfall.

Approximately 119 million gallons of precipitation falls on college property each year, based on New London Weather History Reports from 2014. Annual precipitation by 2100 is estimated to increase by about 20%, meaning 142.8 million gallons would fall on campus.

The total surface area of campus is 92.5 acres, of which 19.43 acres are impervious surface. That is to say, 21% of the upper campus area is comprised of impervious surface. We calculated that on our impervious surfaces, annual water runoff is around forty-five million gallons.

Through our data acquisition, we determined the circumference, area, and composition of the marsh area of Susan's Swamp. We took 102 survey points, and used that data to create a bathymetry map, showing the contours and the makeup of the bottom of Susan's Swamp. We calculated that Susan's Swamp, at capacity, holds 1.52 million gallons, which is approximately equivalent to eight times the volume of Hogan swimming pool. Since Susan's Swamp rests near capacity, there is an overflow drain installed in case of a large precipitation event.



Soil makeup and type is an important consideration in landscape management, providing services such as:

- Food and other biomass
- Environmental interaction: storage, filtrating
- Biological habitat
- Source of raw materials
- Physical and cultural heritage
- Platform for man-made structures: buildings, highways (Batjes, 2002)

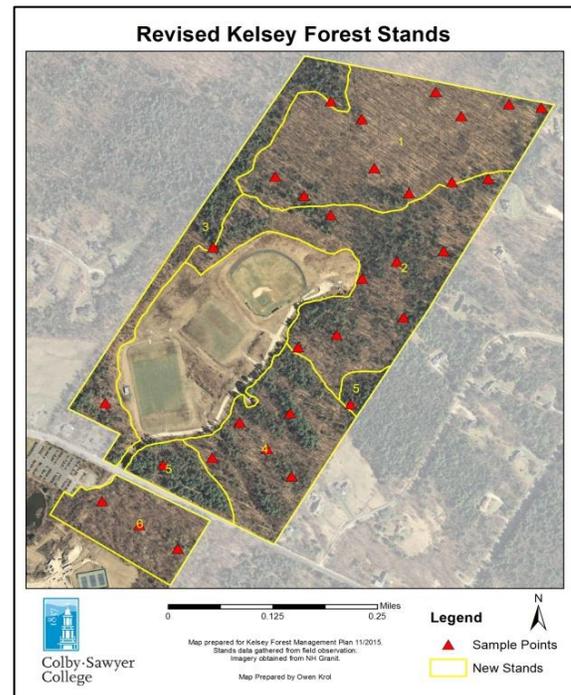
The soil that is most prevalent throughout campus is Dixfield fine sandy loam. This soil is moderately well drained and partially hydric. The parent material is derived from granite, gneiss, or schist. However, there are seven other soil classifications on campus that are moderately well drained, sandy loams that are till derived from granite, gneiss, or schist; these are also partially hydric.

Forest Management

Colby-Sawyer owns a 112.77 acre parcel on the north side of campus, 85.61 acres of which is known as Kelsey Forest. Also located on the north side of campus is a 9.43 acre section of forest land adjacent to Parking Lot K. In 1999, Kelsey Forest was inventoried by Forester

Pierre Bedard, but since then, no new forest management plan was done for the college. A forest should be inventoried every ten years in order to ensure an accurate representation of the forest. A new inventory of Kelsey Forest was deemed necessary.

In 1999, Bedard classified Kelsey Forest into thirteen stands, but for our 2016 plan, we classified Kelsey Forest into six stands, and included the parcel across Seamans Road. We identified the merchantable timber value for the forest. Also important was identifying areas of the forest that are clearly dominated by a particular species, which affects merchantable timber value. Some other figures generated as part of the forest sampling were biomass and carbon storage. Colby-Sawyer is continually trying to reduce its carbon footprint and an updated carbon storage value will help the college calculate its offset. The last important factor when dealing with forest sampling is natural history, which includes disturbance history and wildlife habitat. Kelsey Forest is an important source of biodiversity, wildlife habitat, and educational opportunities on campus.



Conclusion

This document focuses on the extensive research required to gain a comprehensive understanding of a landscape, with particular focus in stakeholders and culture, landscape practices, water management, and forest management. Moving forward, this research will be applied along with permaculture principles to create a sustainable and comprehensive landscape management plan, while upholding Colby-Sawyer College's strategic themes. These design recommendations will be included in the report to be completed in the spring of 2016.