

Colby-Sawyer College: Landscape Management Research

December 7, 2015

Overview

Stakeholders & Culture

Landscape Practices

Water Management

Forest Management

Acknowledgments

Next Steps

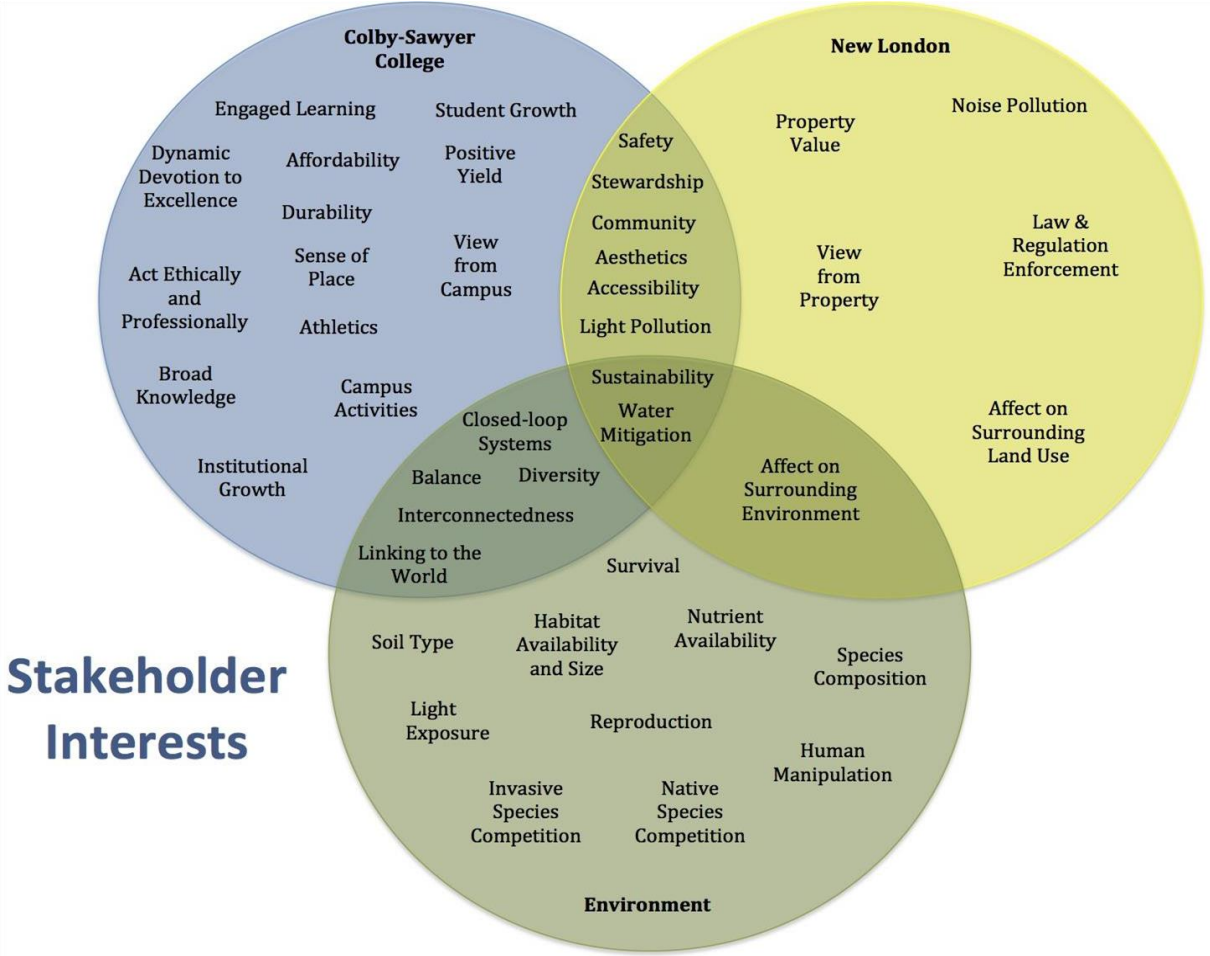






Stakeholders & Culture

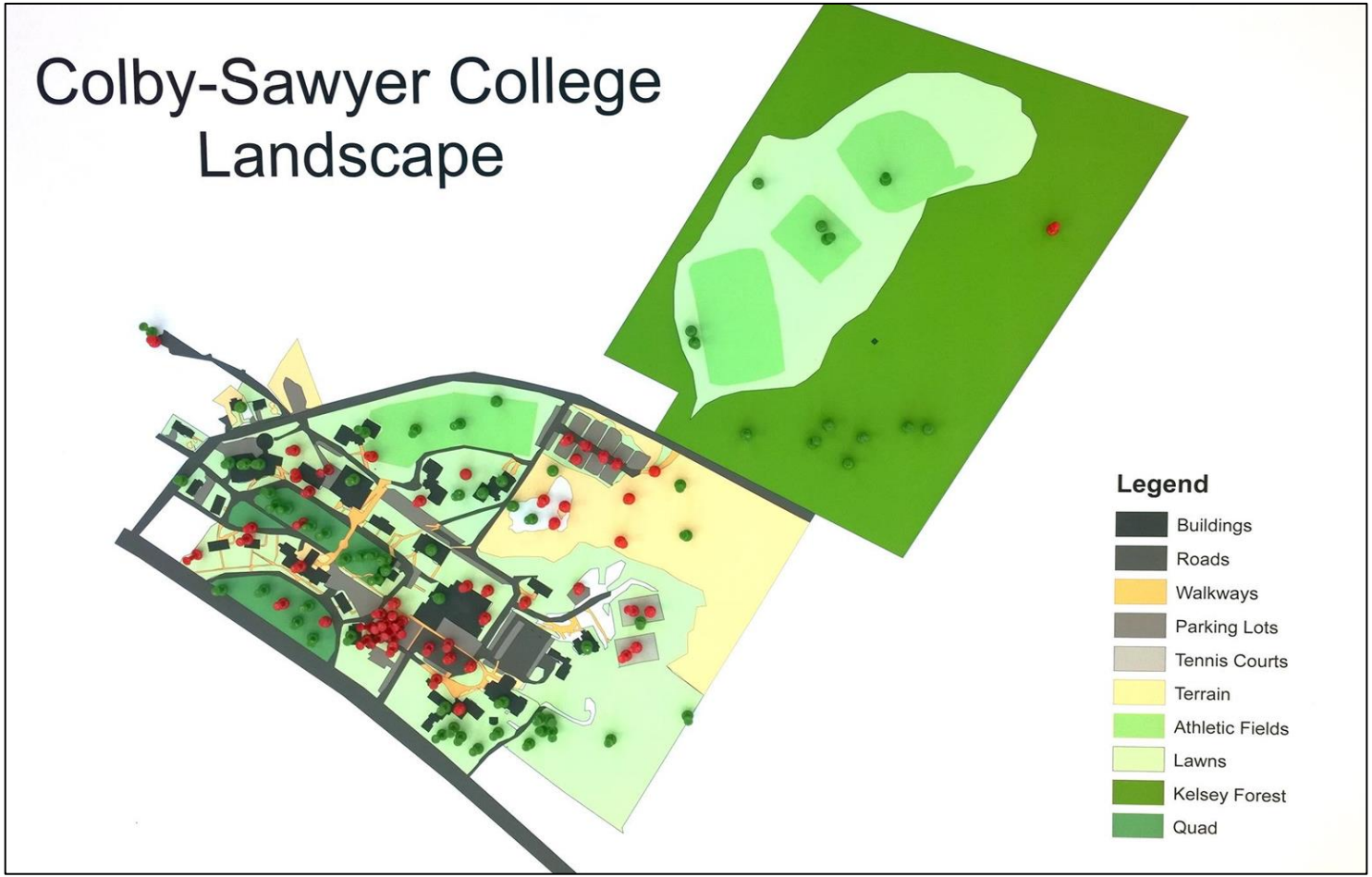
Stakeholder Mapping



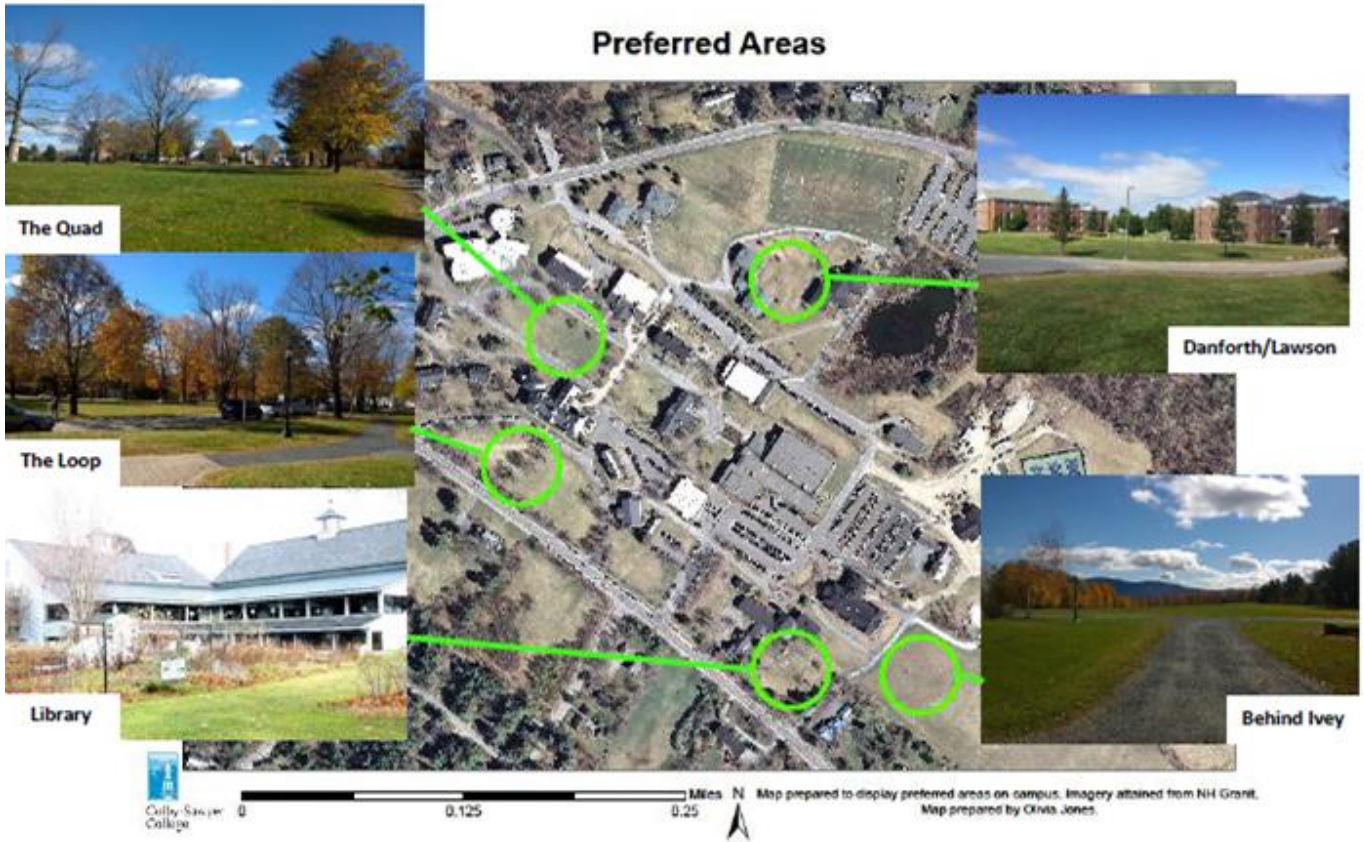
Interviews

Academics	Engagement, Orientation, Informative, Plays to Skillsets, Teaching Spaces
Aesthetics	Recreation, Transportation, Iconic New England, Consistency, Signage, Viewsheds
Culture	Sense of Place, Orientation, Recreation, Experience, Hub, Third Space, Landscape Mentality, Community, Abutters, Ideologies
Economics	Resources, Donations, Support, Feasibility, Cost-effective
Environment	Permaculture, Student Initiatives, Sense of Place, Sustainability, Natural, Organic, Use, Facilitation
Management	Design Thinking, Structure, Application, Ease of Maintenance

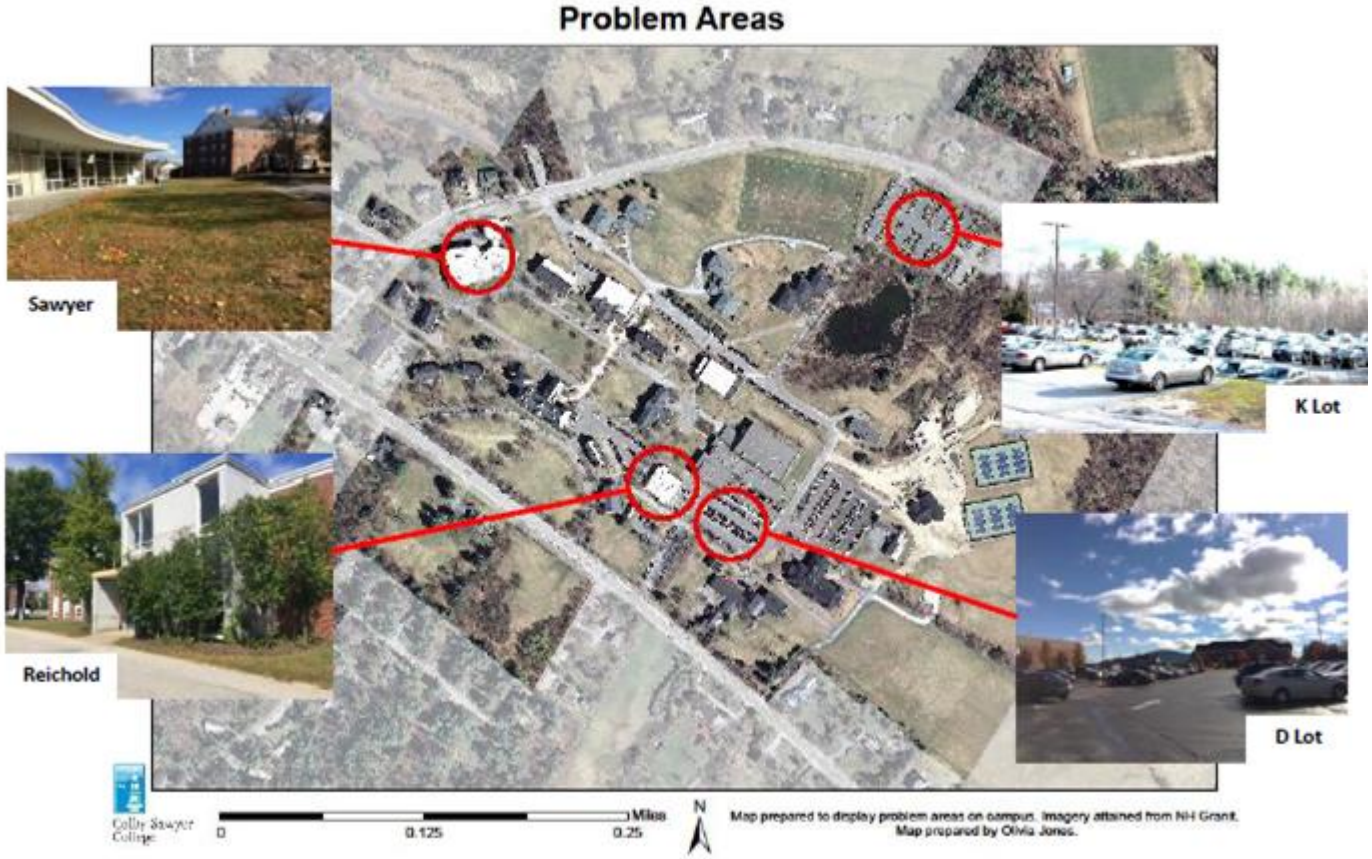
Pin Map Surveys



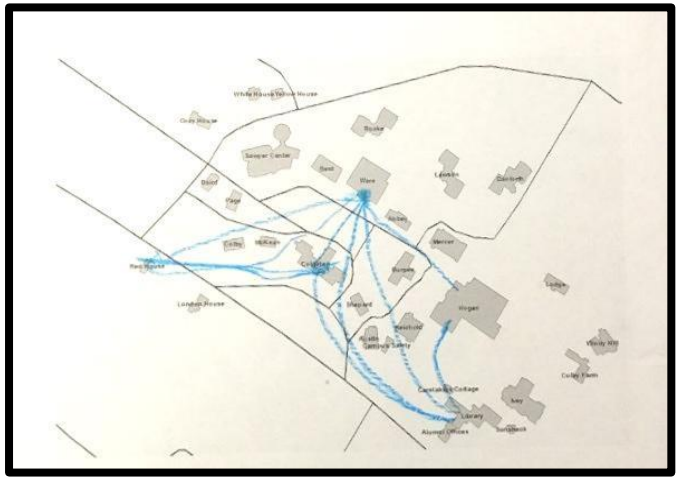
Results from Pin Map Surveys

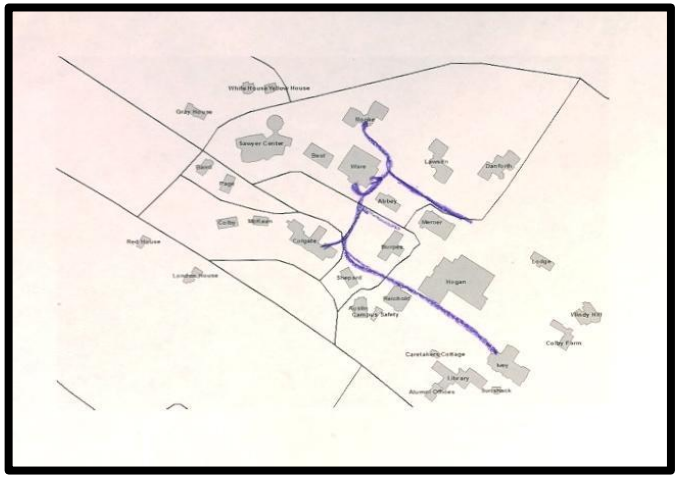


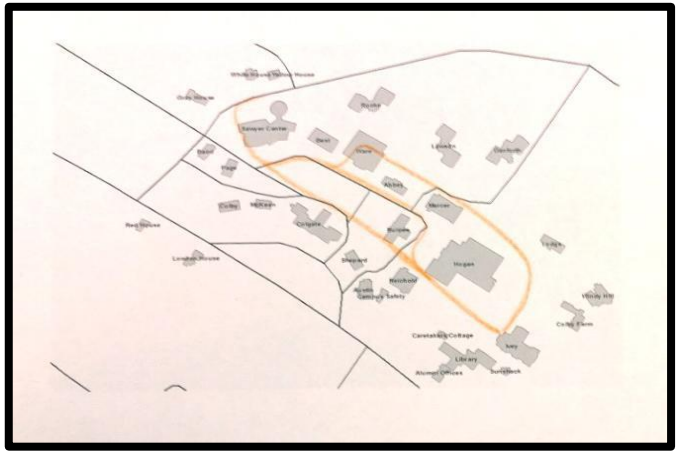
Results from Pin Map Surveys



Foot Traffic Drawn Map Surveys





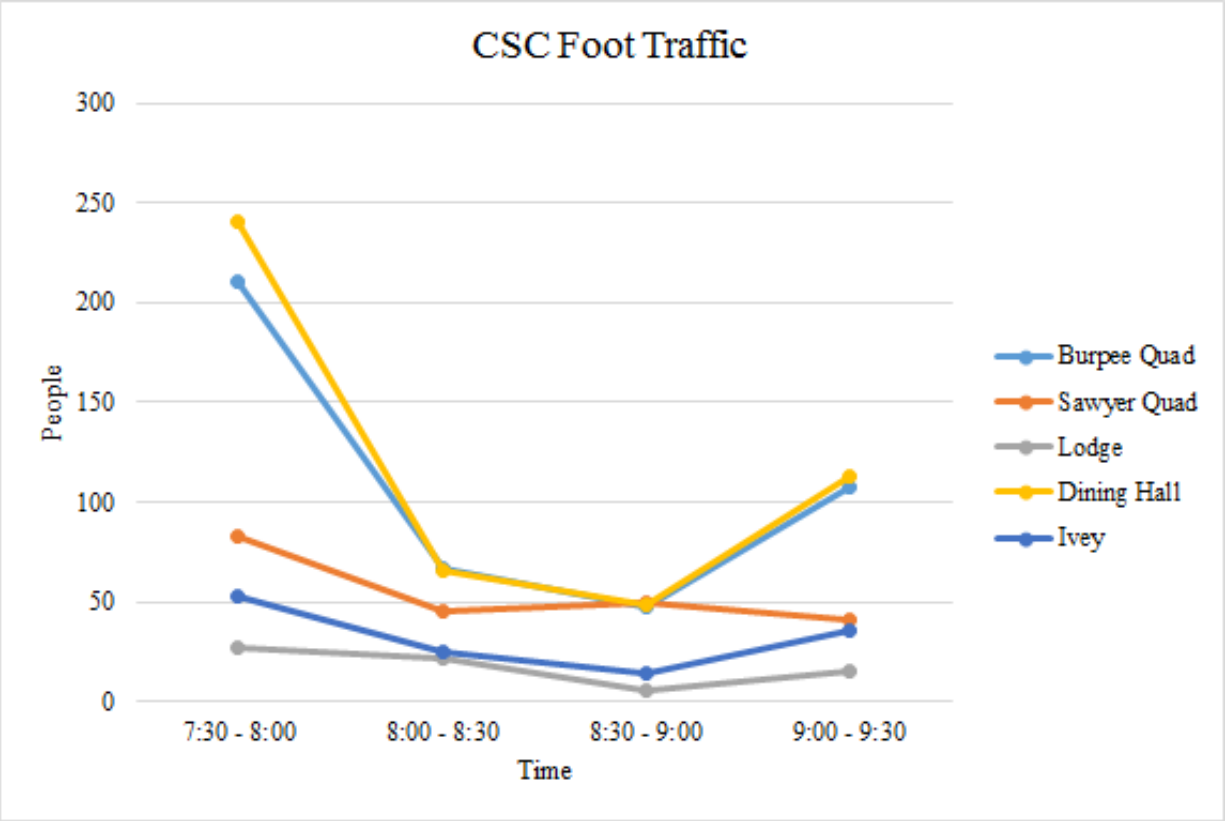




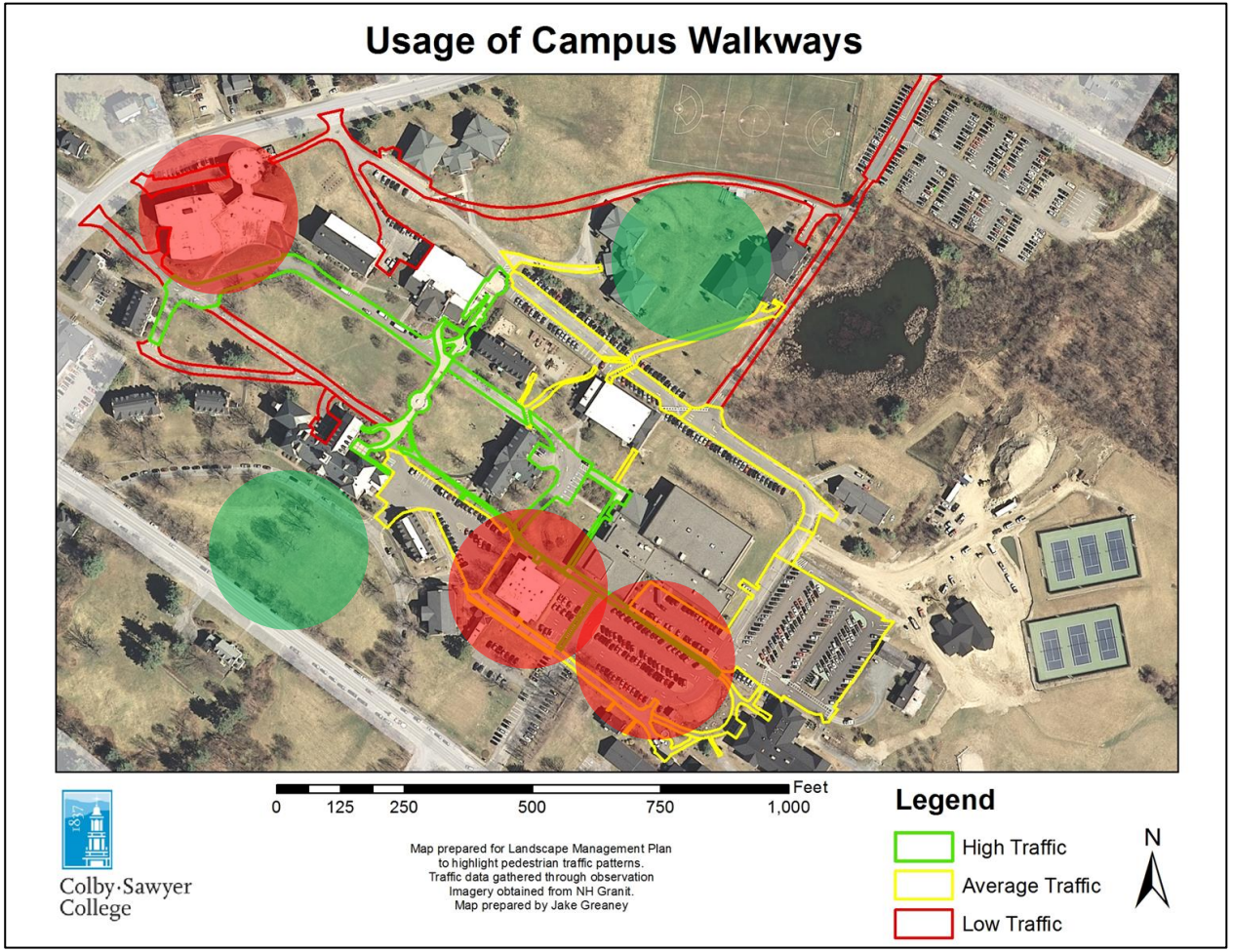
Foot Traffic Observations



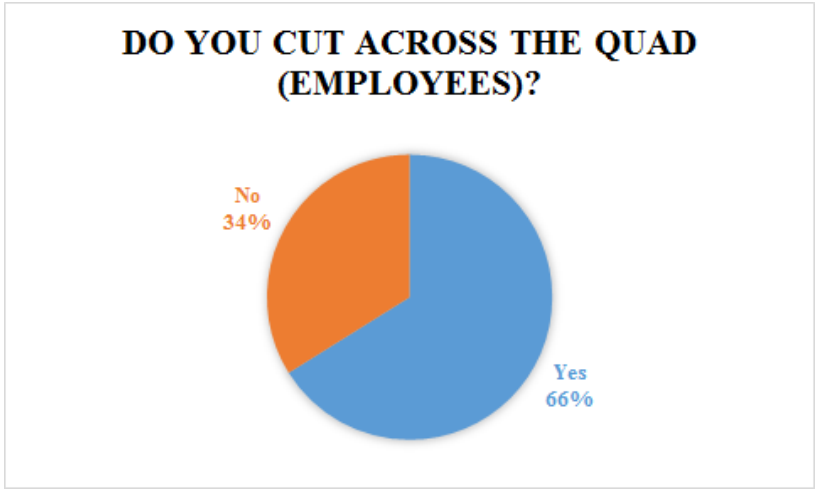
Foot Traffic Observations

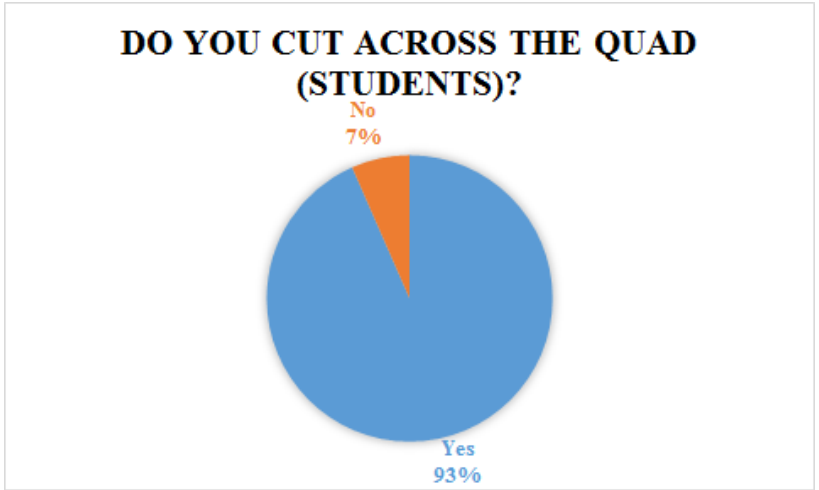


Foot Traffic Analysis

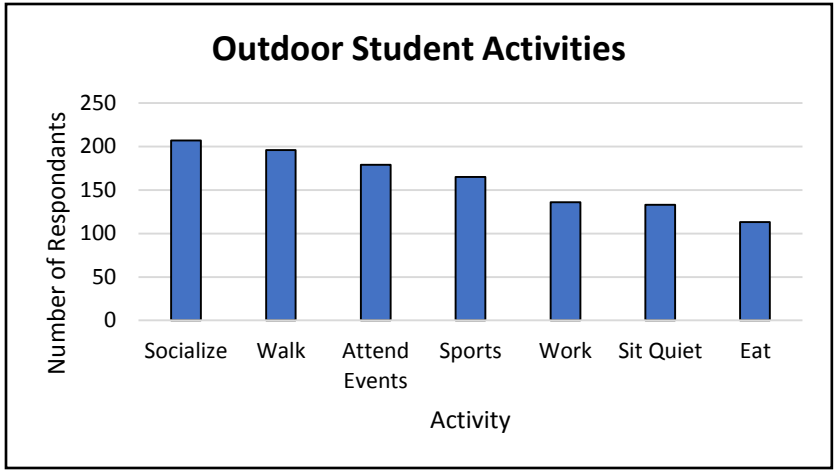


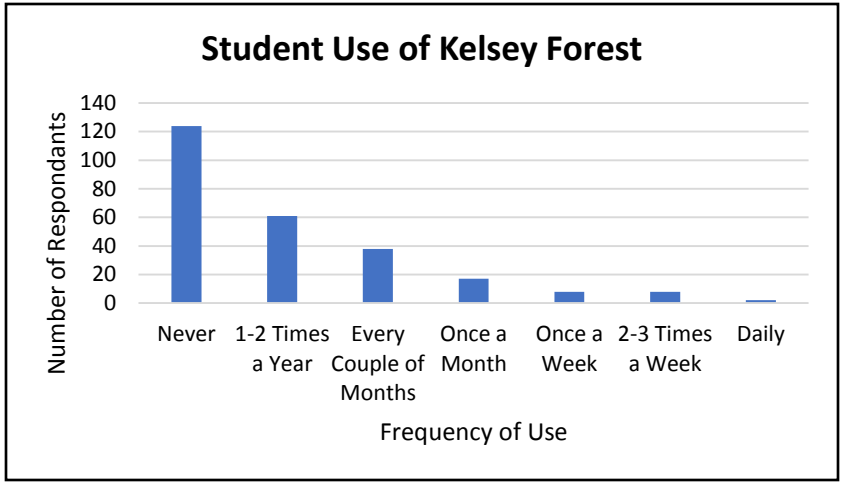
Campus Surveys





Campus Surveys - Landscape Use





Colby-Sawyer College Tours





Best Viewsheds
- Mountain views
- Library

Problematic Areas
- Roadways/Paths
- Parking Lots

Learning Opportunities
- Gardens
- Sun Shack
- Sugar Shack
- Wind + Solar Power

Cultural Expression
- Increase signage

Hampshire College Tour





Culture/Brand

- Sustainable
- Open-minded
- Innovative

Attractive Areas

- Sustainable Initiatives
- Agriculture

Implementation Ideas for CSC

- Meadow Project
- Pedestrian accessibility
- Greenhouses

Community Outreach Event

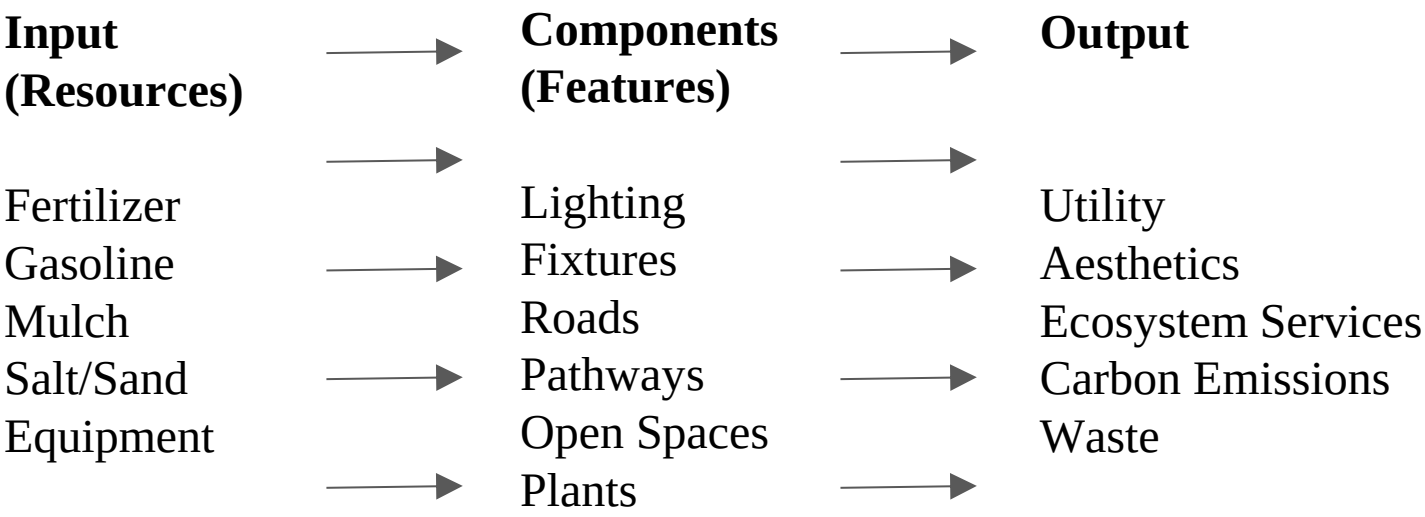


Key Topics

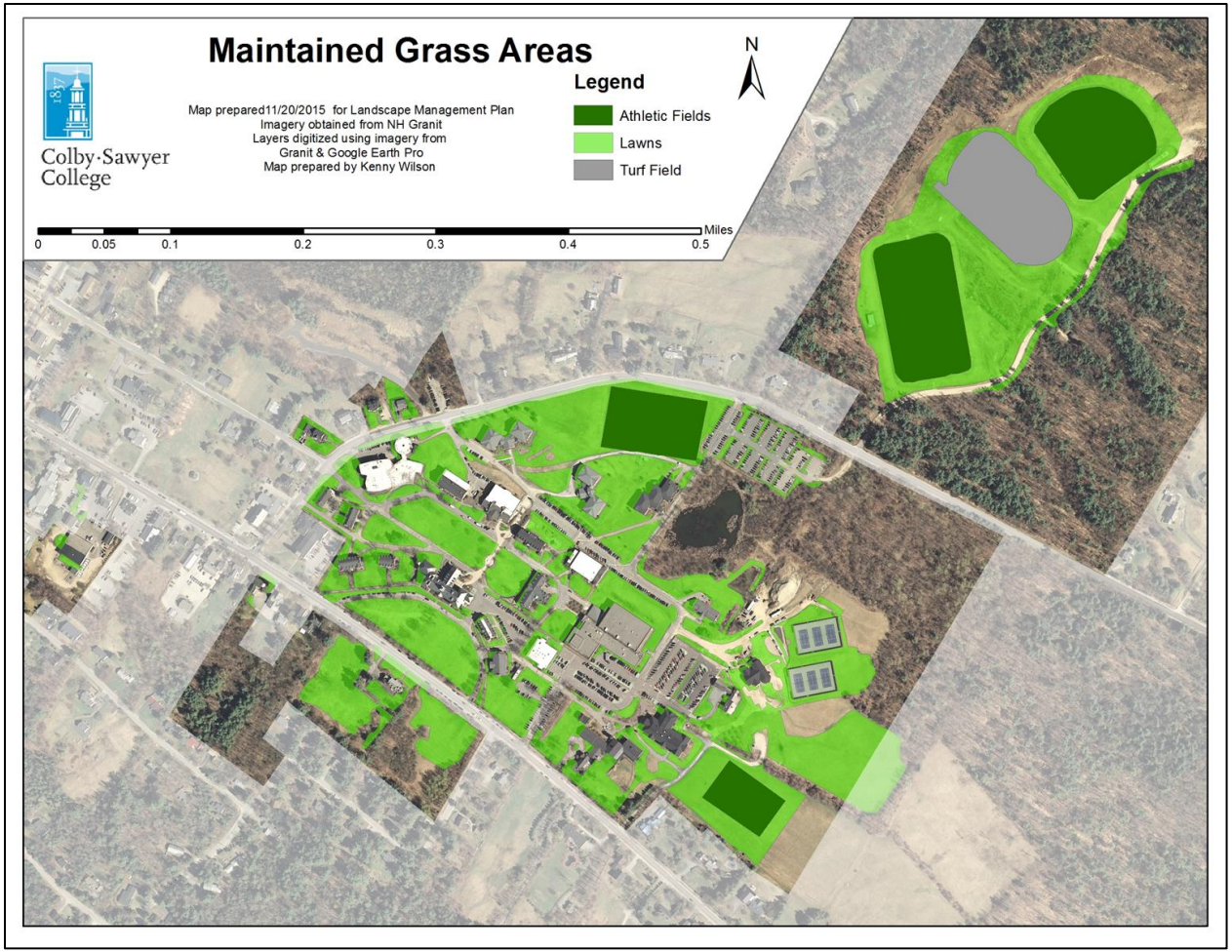
- Kelsey Forest & Susan Swamp Maintenance
- Safety within the Landscape
- Diversifying the Landscape
- Campus as a Living Laboratory
- Maintaining the College Brand

Landscape Practices

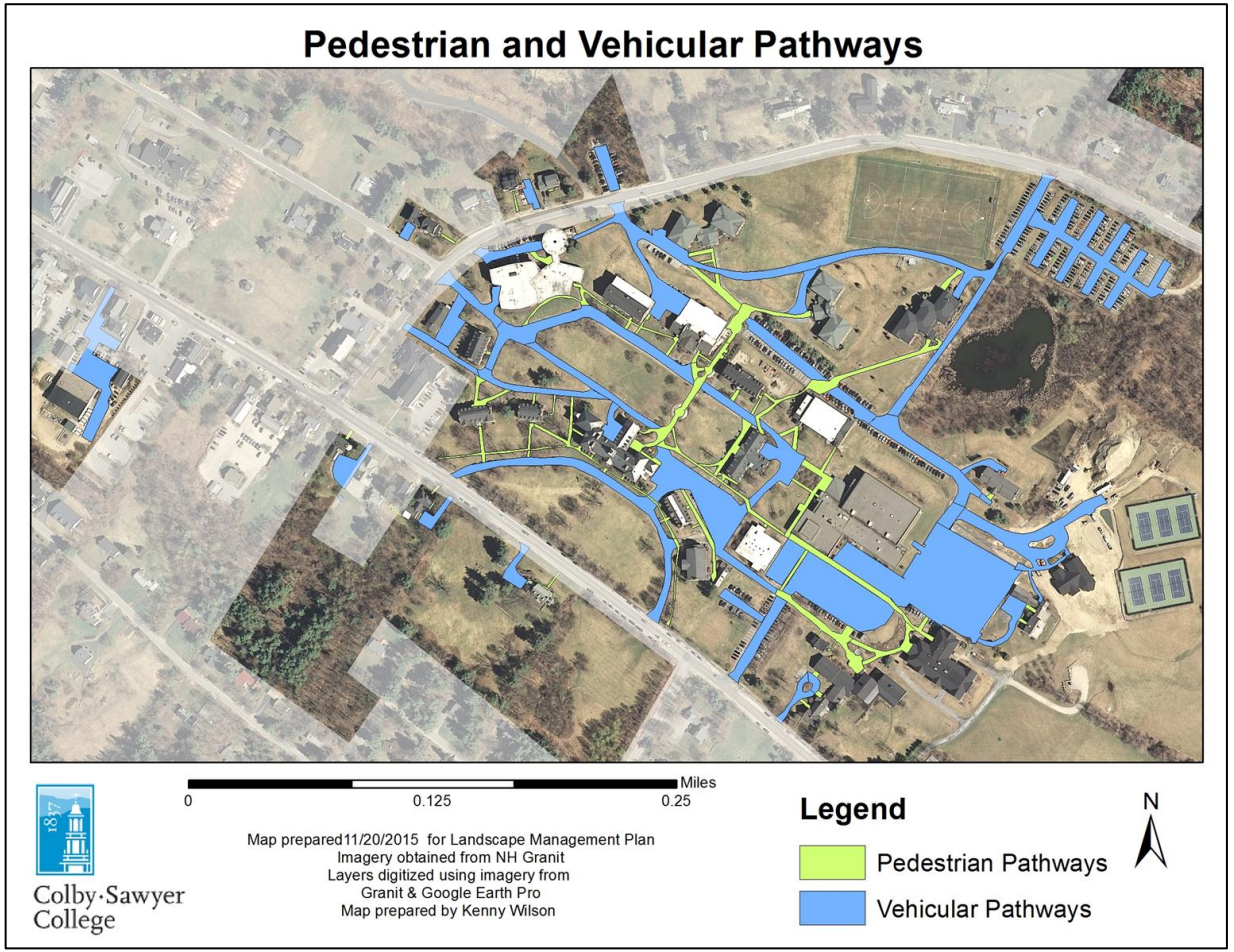
The Landscape System



Landscape Practices



Landscape Practices



Fertilizer



Key Figures: (Year 2014/2015)

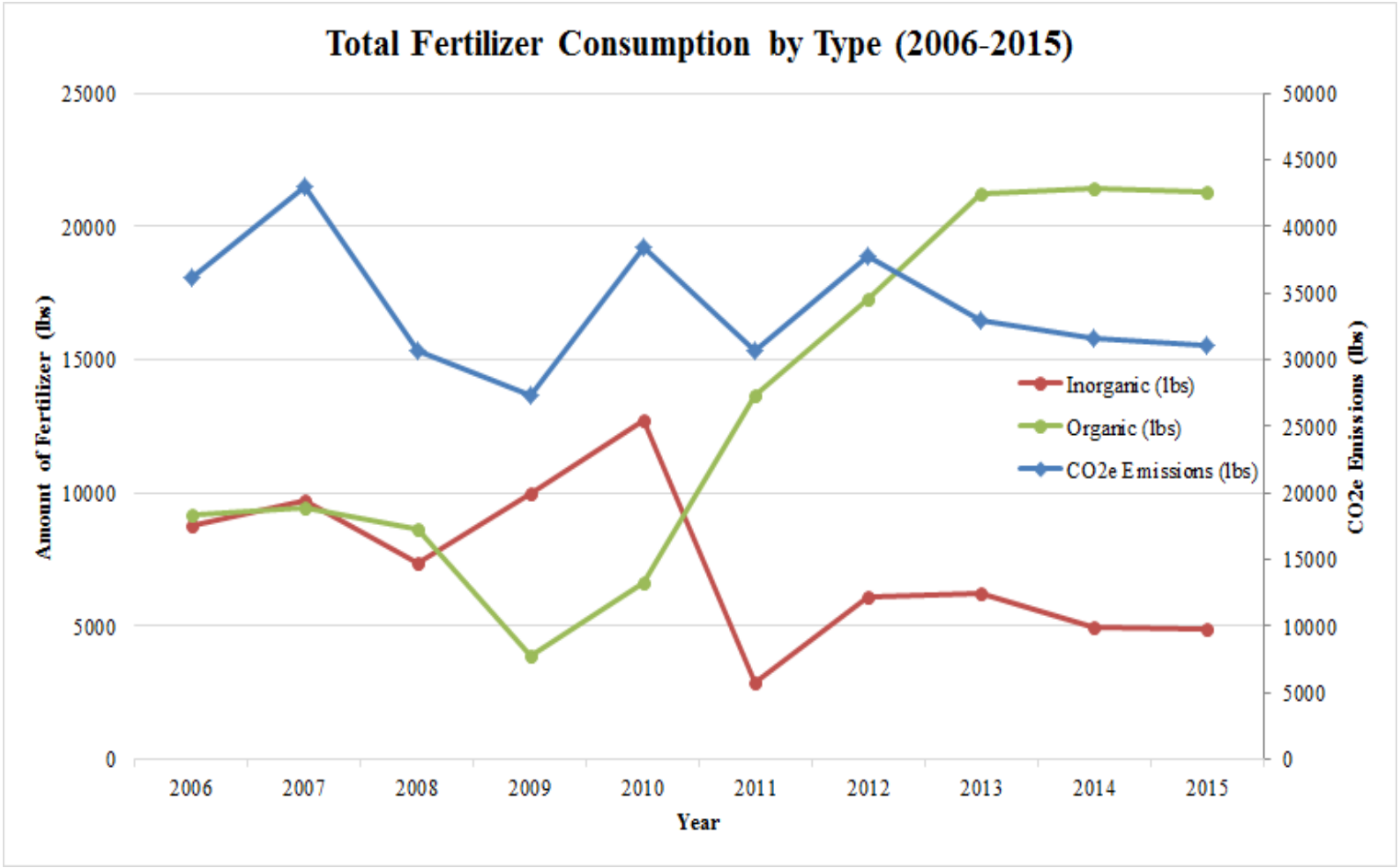
Quantity - 26,170 lbs

Cost - $10,200

Cost Per Unit Area - $186 per acre

Emissions Per Unit Area - 514 lbs CO_2 Equivalent per acre

Fertilizer


Total Fertilizer Consumption by Type (2006-2015)
Amount of Fertilizer (lbs)
CO2e Emissions (lbs)
Year
Inorganic (lbs)
Organic (lbs)
CO2e Emissions (lbs)
25000
20000
15000
10000
5000
0
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015

Gasoline

Key Figures: (Year 2014/2015)

Quantity - 4,340 gallons

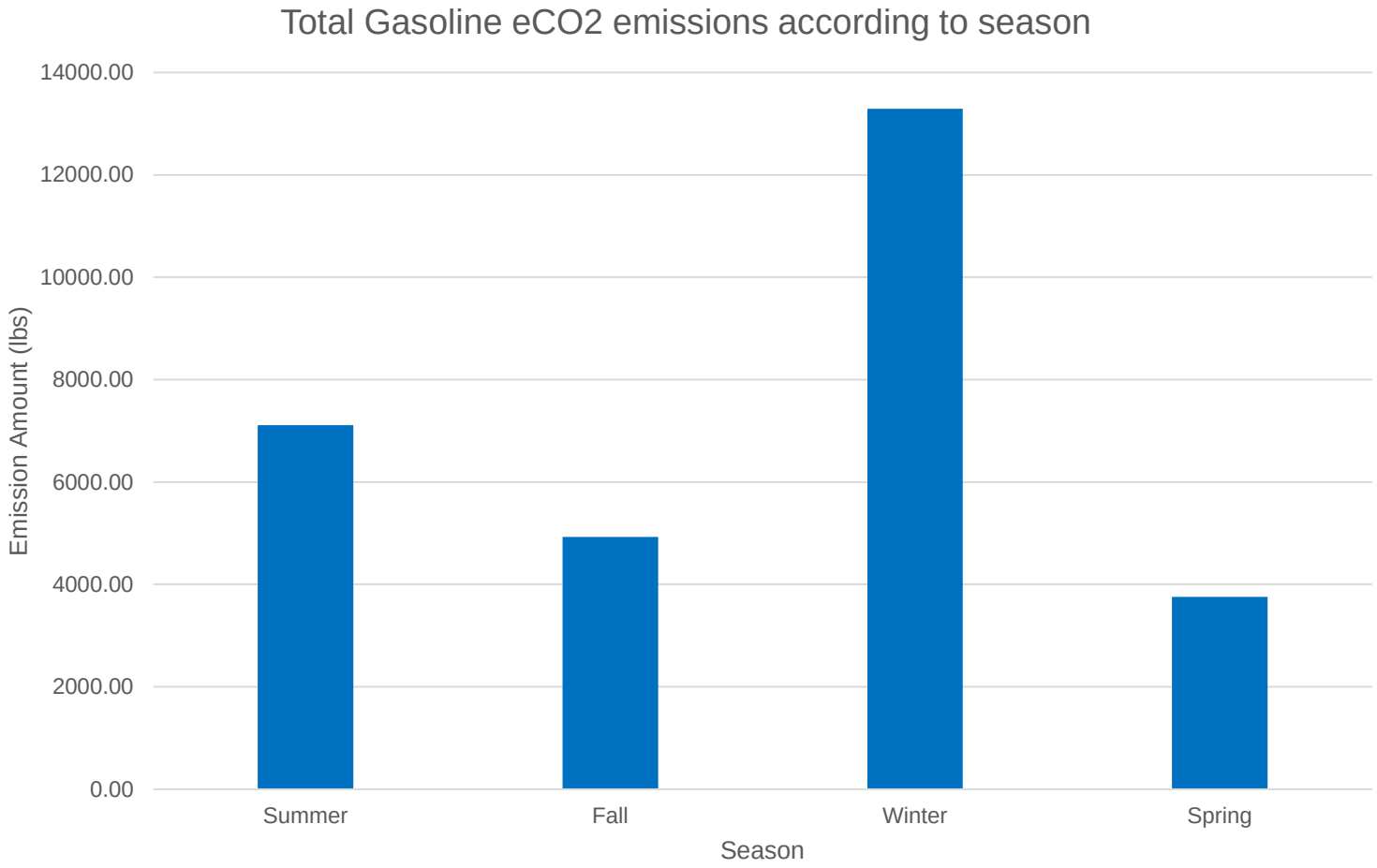
Cost - $10,069

Cost Per Unit Area - $151 per acre

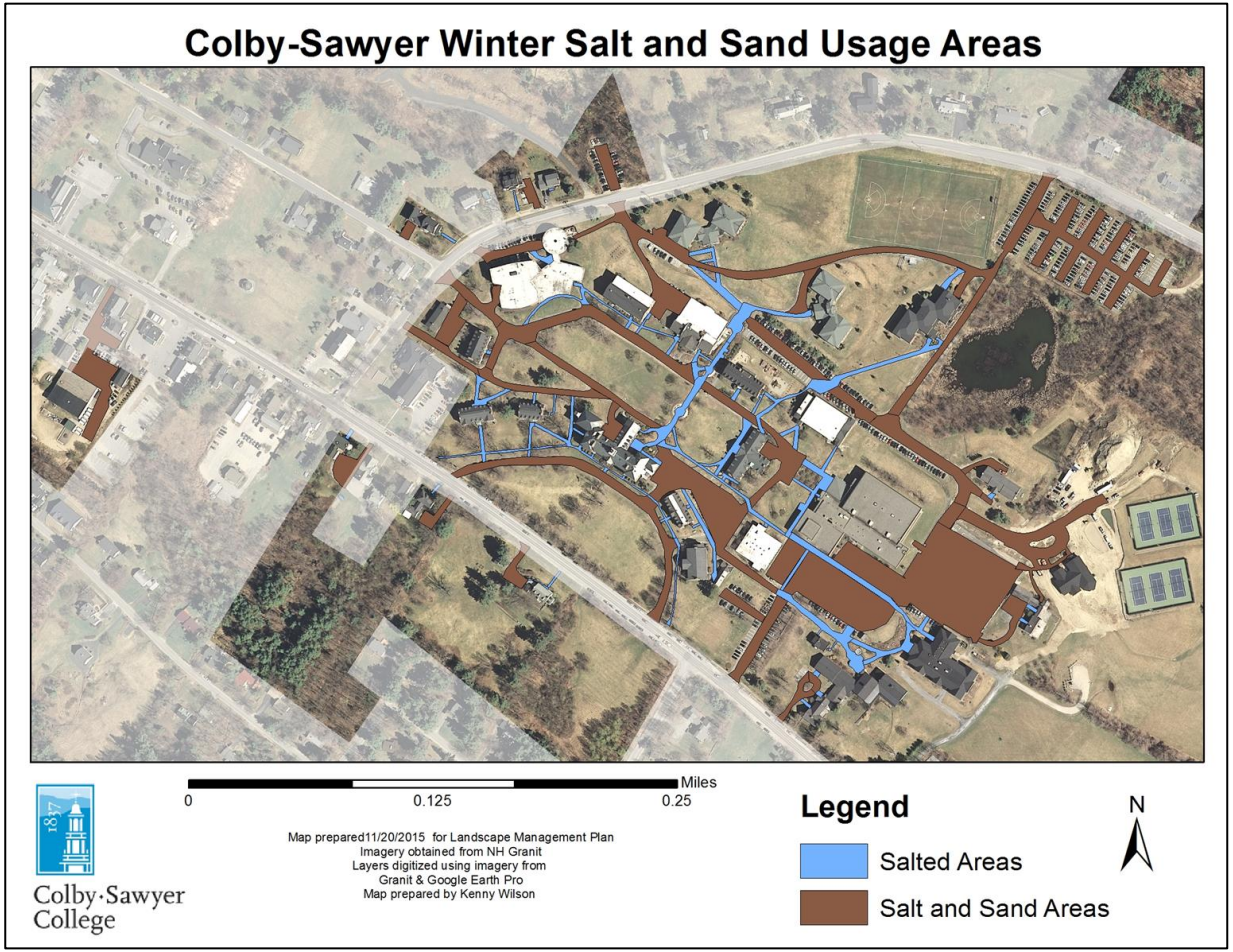
Emissions Per Unit Area - 4,783 lbs CO_2 Equivalent per acre



Gasoline


Total Gasoline eCO2 emissions according to season
14000.00
12000.00
10000.00
8000.00
6000.00
4000.00
2000.00
0.00
Emission Amount (lbs)
Summer
Fall
Winter
Spring
Season

Landscape Practices



Salt/Sand

Total Annual Usage of Salt and Sand	
Type	**Usage (lbs)**
Green Magnum Salt	38,850
Blue Lighting Salt	4,900
Regular Salt	80,192
Sand	310,400
Totals	**434,342**

Key Figures:

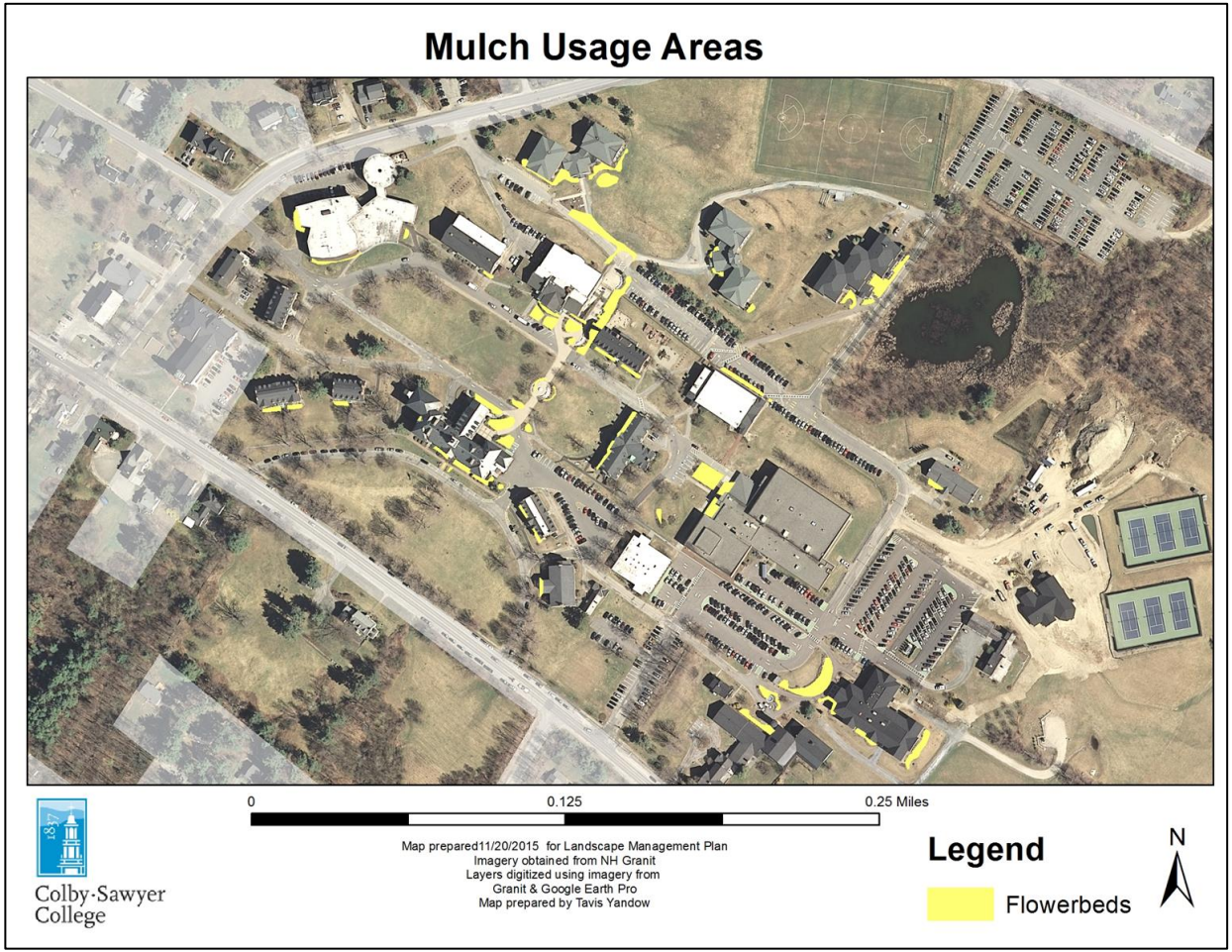
Quantity = 434, 342 lbs

Salt = 123,942 lbs

Sand = 310,400 lbs

Cost = $37,065

Landscape Practices



Mulch

Key Figures:

<u>Current Usage</u> -

69,188 lbs of Bark Mulch costs $4,000
(34.6 tons)

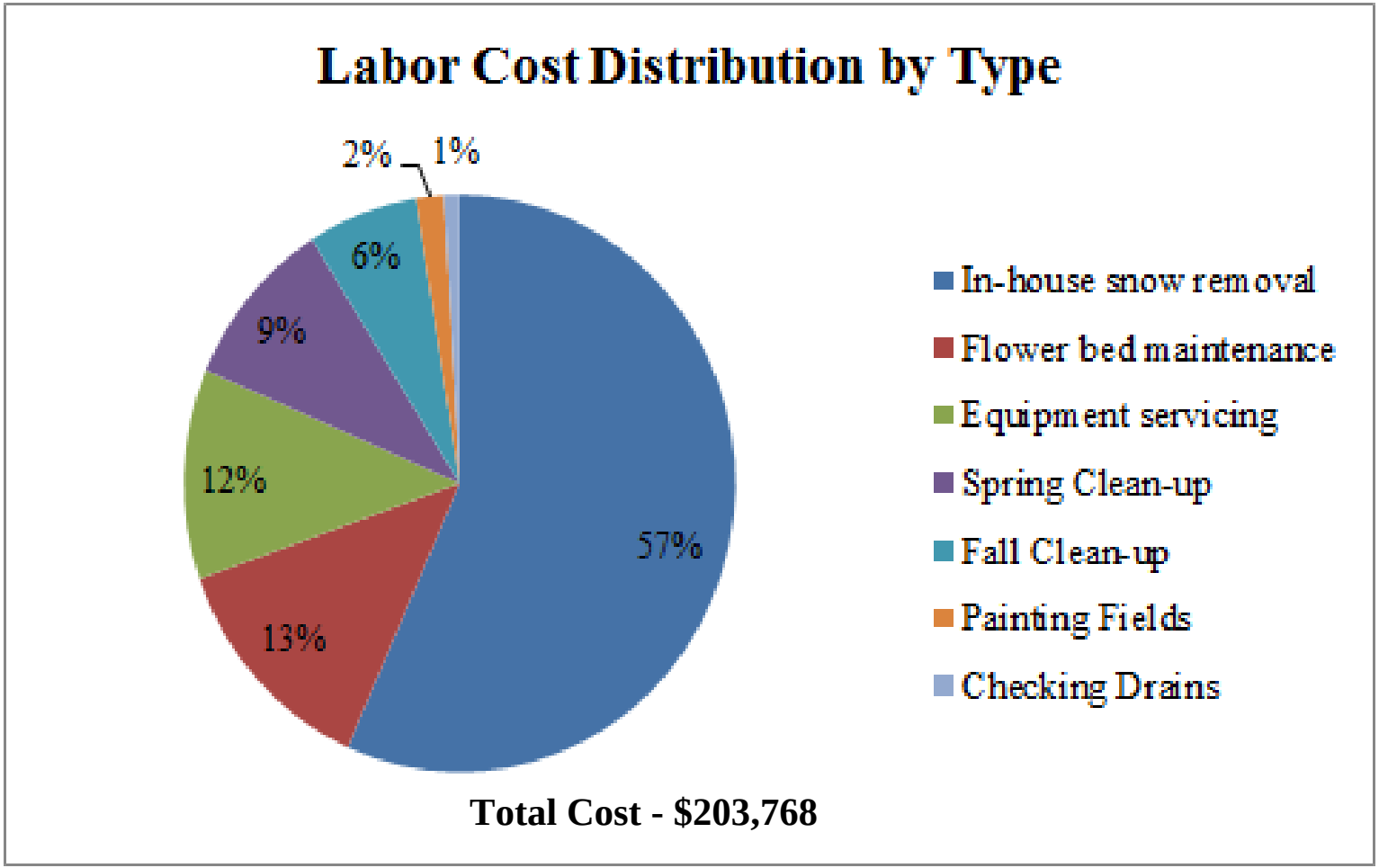


<u>Current Production</u> -

111,573 lbs of Leaf Litter
(55.8 tons)



Labor



Total Cost - $203,768

Summary

Financial Costs (in $)

Type of Space	Area (acres)	Gas	Fertilizer	Mulch	Salt/Sand	Labor	Total Cost	Unit Area Cost
Lawn	43.69	$3,794	$8,127	N/A	N/A	$36,680	$48,601	$1,112
Sports Fields	11.18	$949	$2,080	N/A	N/A	$12,709	$15,738	$1,408
Flower Bed	0.83	N/A	N/A	$4,000	N/A	$27,134	$31,134	$37,511
Pedestrian Pathways	1.99	$905	N/A	N/A	$6,240	$21,421	$28,566	$14,355
Road Ways and Parking	9.86	$4,421	N/A	N/A	$30,825	$105,823	$141,069	$14,307
Totals	**67.55**	**$10,069**	**$10,206**	**$4,000**	**$37,065**	**$203,768**	**$310,653***	**$4,599***

Summary

Environmental Costs (in lbs of CO_2 Equivalent Emissions)

Type of Space	Area (Acres)	Fertilizer (lbs)	Gasoline (lbs)	Unit Area Cost (CO_2e)
Lawn	43.69	24,743	5,817	257
Sports Fields	11.18	6,332	1,454	257
Pedestrian Pathways	2.00	N/A	3,673	2,391
Road Ways and Parking	9.86	N/A	18,142	2,391
Total	**54.87**	**31,075**	**29,087**	**514**

Current Landscape Features







Lighting

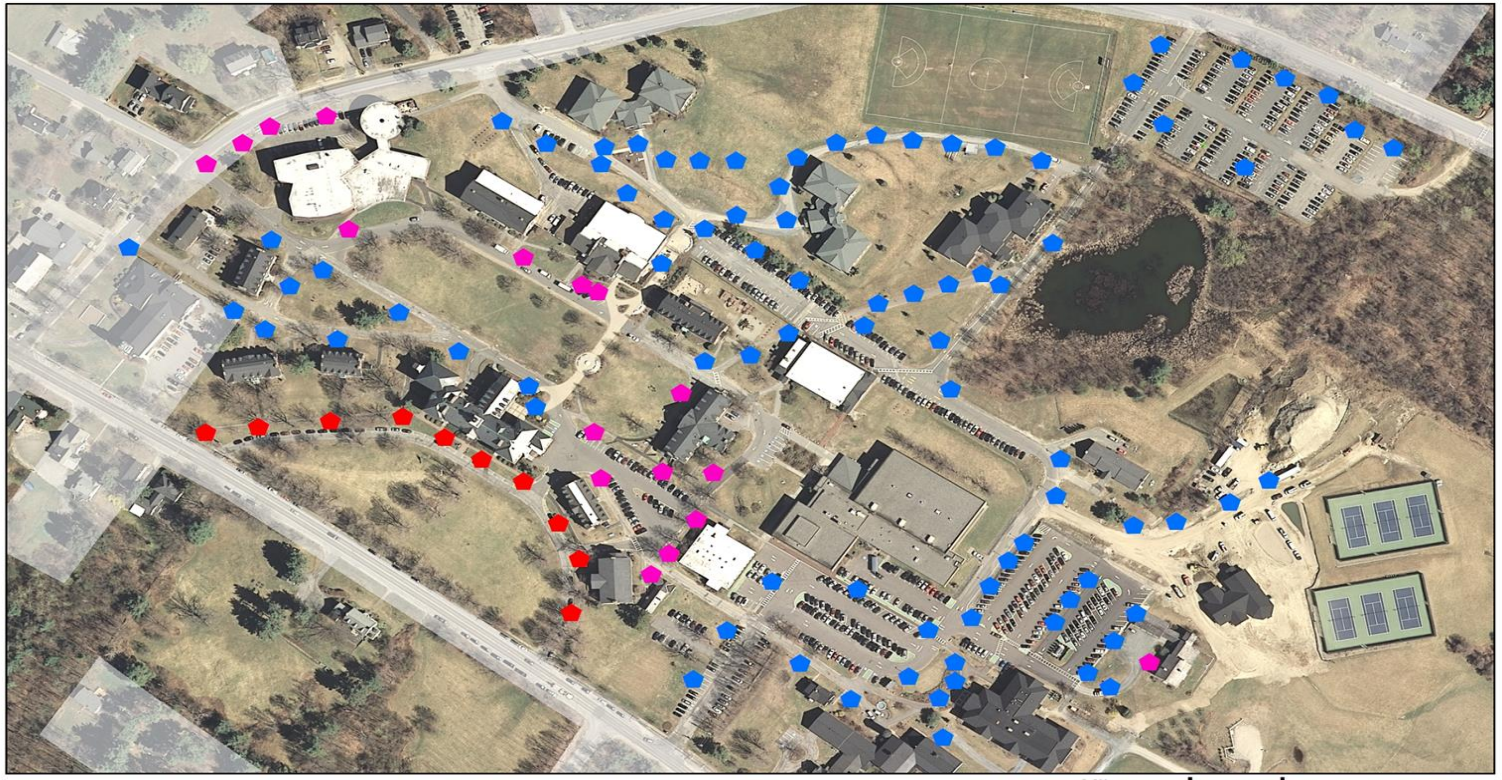






Seating

Lighting on Campus



Map prepared for Landscape Management Plan 11/2015
Imagery obtained from NH Granit.
Map prepared by Matthew Plouffe

Colby·Sawyer College

Seating on Campus



Current Landscape Features







Parking Lots

Current Landscape Features

Pavement Surfaces













Campus Trees

Key Figures:

Total Trees - 464

Age Class		
	Quantity	**% of total**
Mature	230	49.50%
Semi-Mature	114	24.50%
Young	120	26%

Condition Class		
	Quantity	**% of total**
Good	307	66%
Fair	128	28%
Poor	28	6%
Dead	1	<1%

48 different species

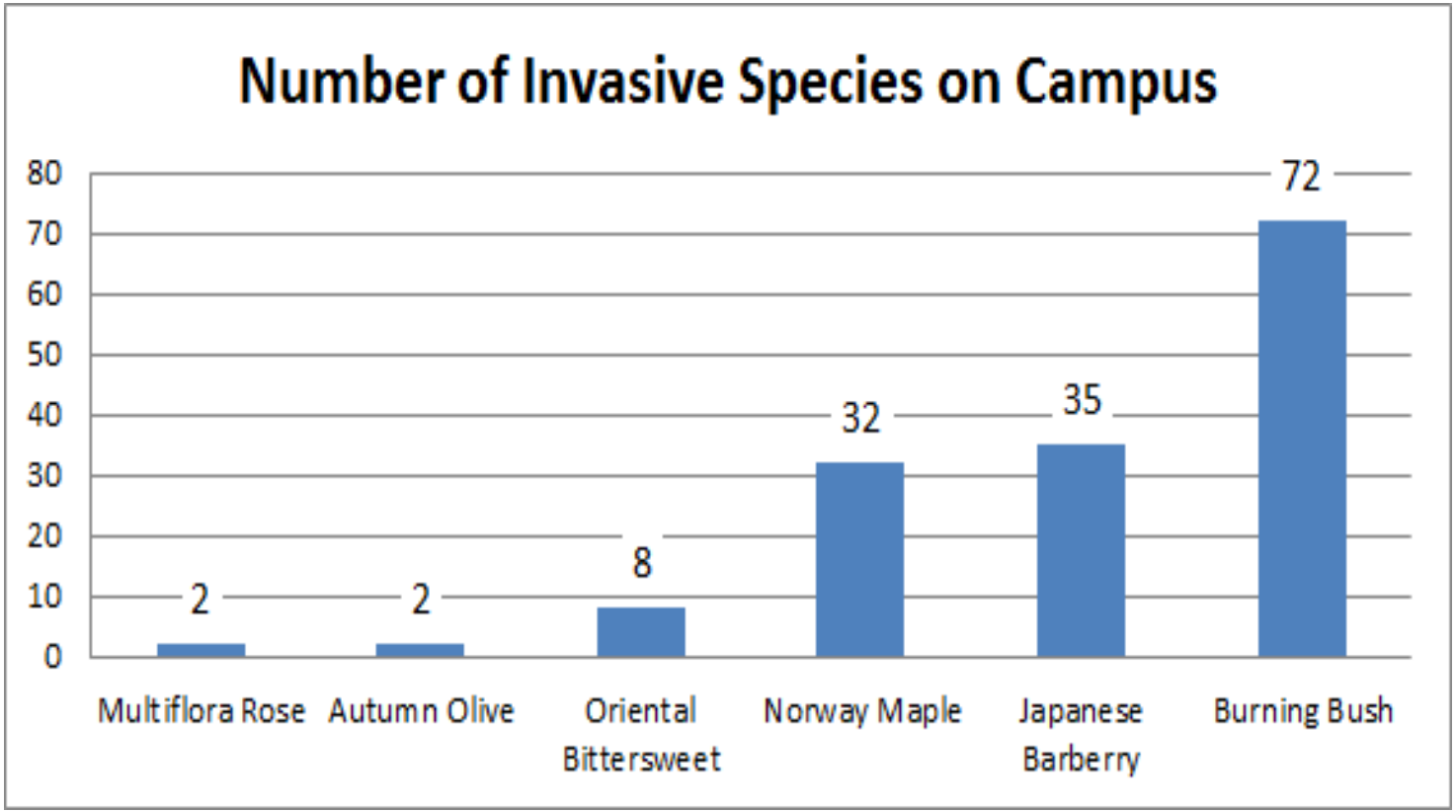
Invasive Species



Burning Bush outside Page Hall



Japanese Barberry



Invasive Species

Colby-Sawyer Invasive Species Map



Miles
0 0.125 0.25

Map prepared for Landscape Management for 11/2015
Imagery obtained from NH Granit.
Species data obtained through field collection.
Map prepared by Kenny Wilson

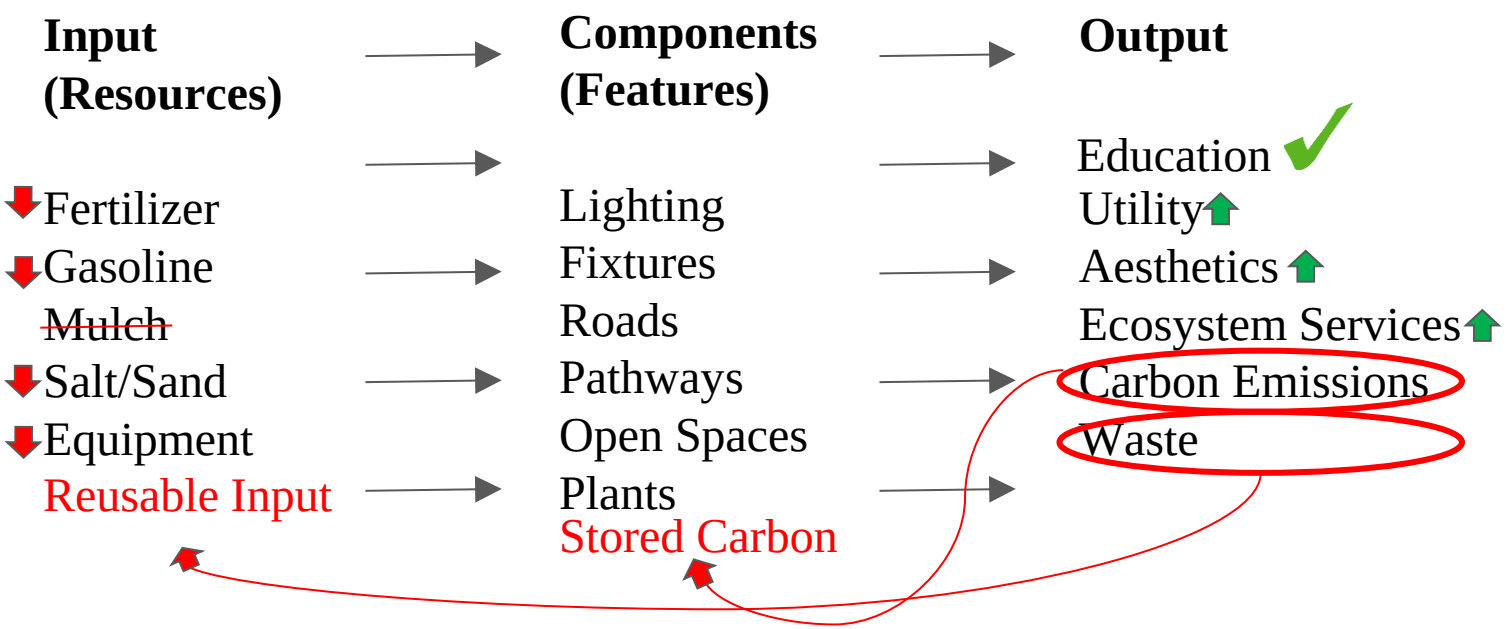
Colby-Sawyer College

Legend

- Multiflora Rose
- Japanese Barberry
- Burning Bush
- Autumn Olive
- Norway Maple
- Oriental Bitersweet
- High Concentration Areas

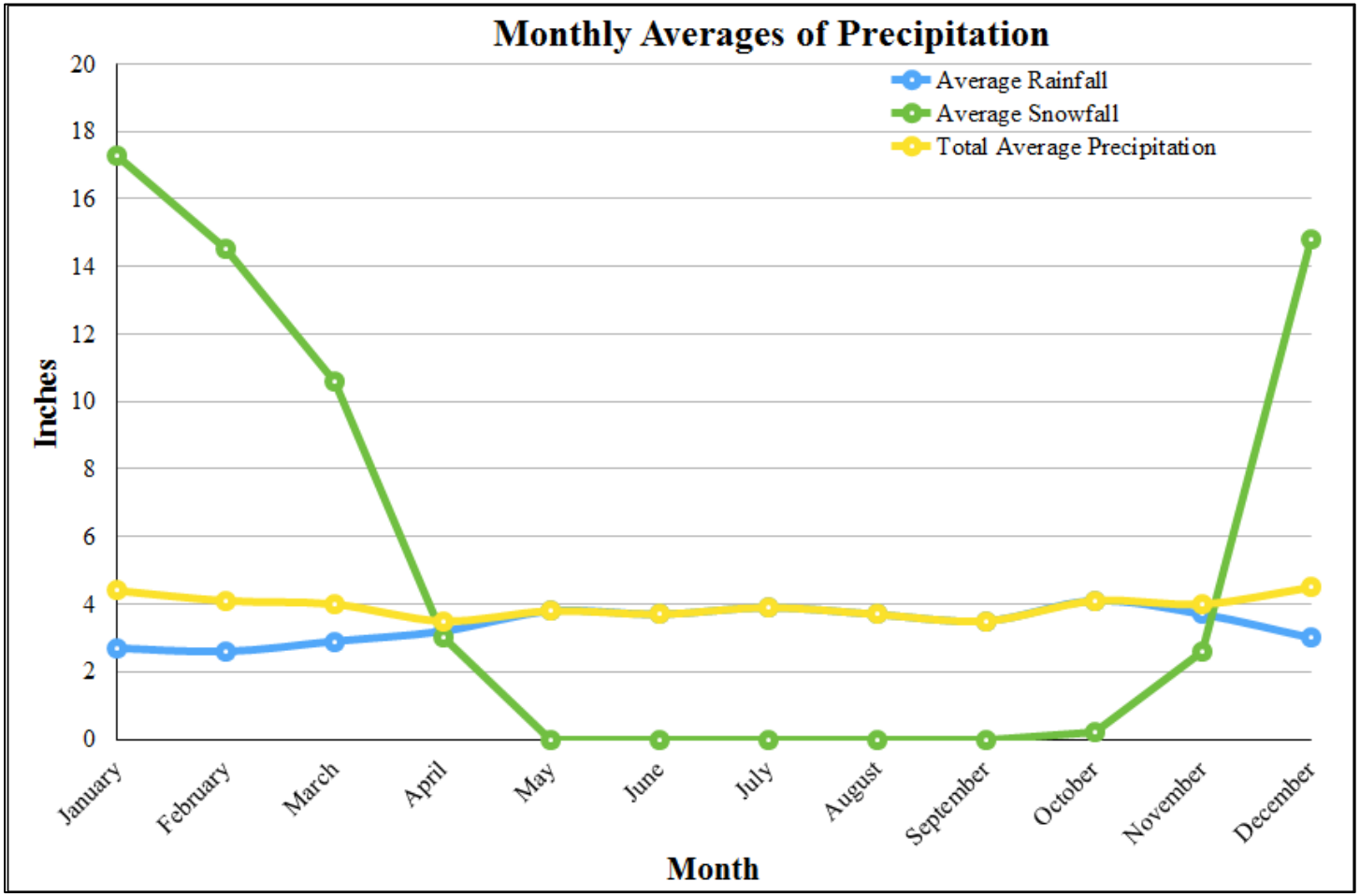
N

Possibilities for the Landscape System



Water Management

Climate


Monthly Averages of Precipitation
Average Rainfall
Average Snowfall
Total Average Precipitation
Inches
20
18
16
14
12
10
8
6
4
2
0
January
February
March
April
May
June
July
August
September
October
November
December
Month

Microclimates

Susan's Swamp



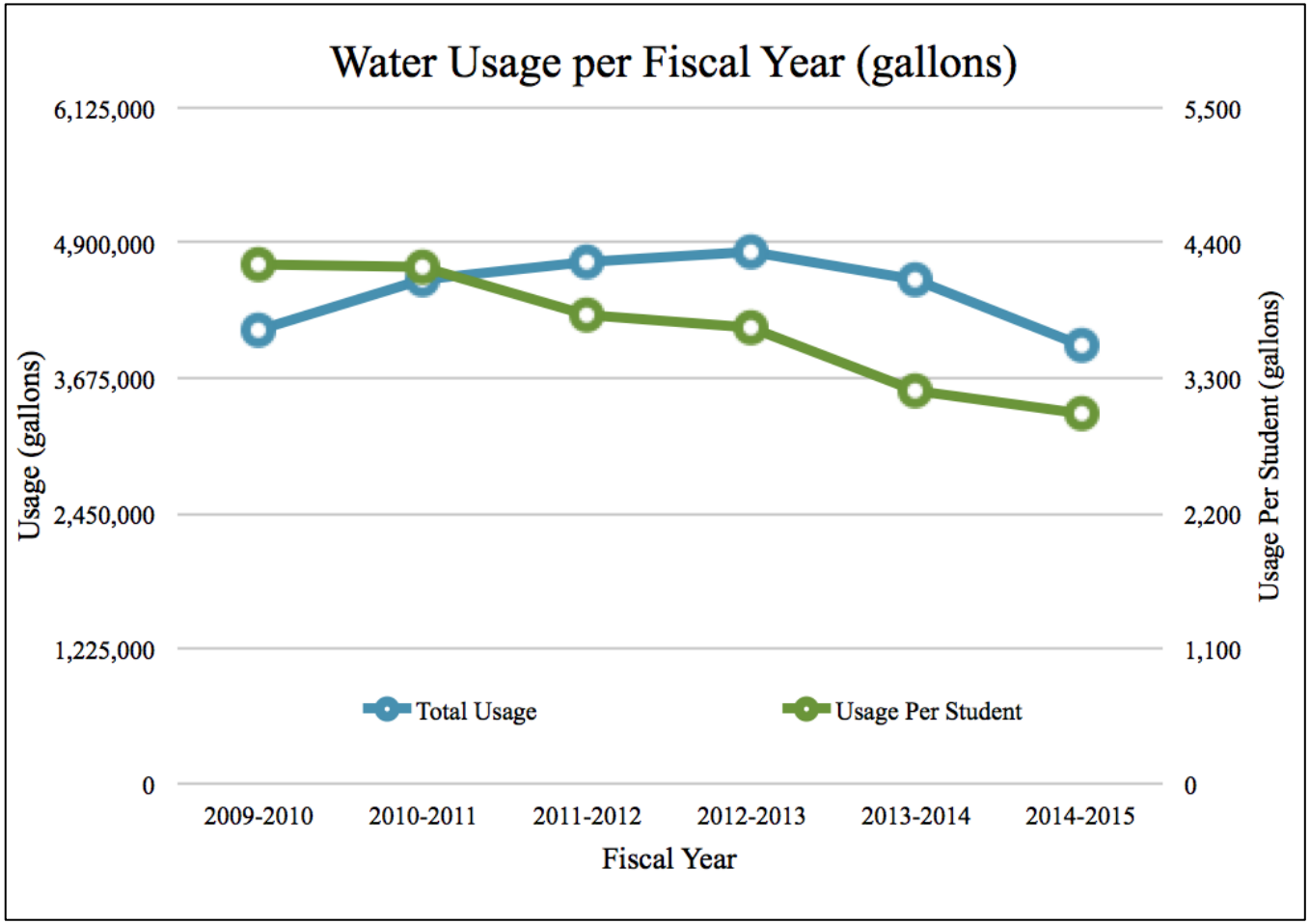
Catchment Basin



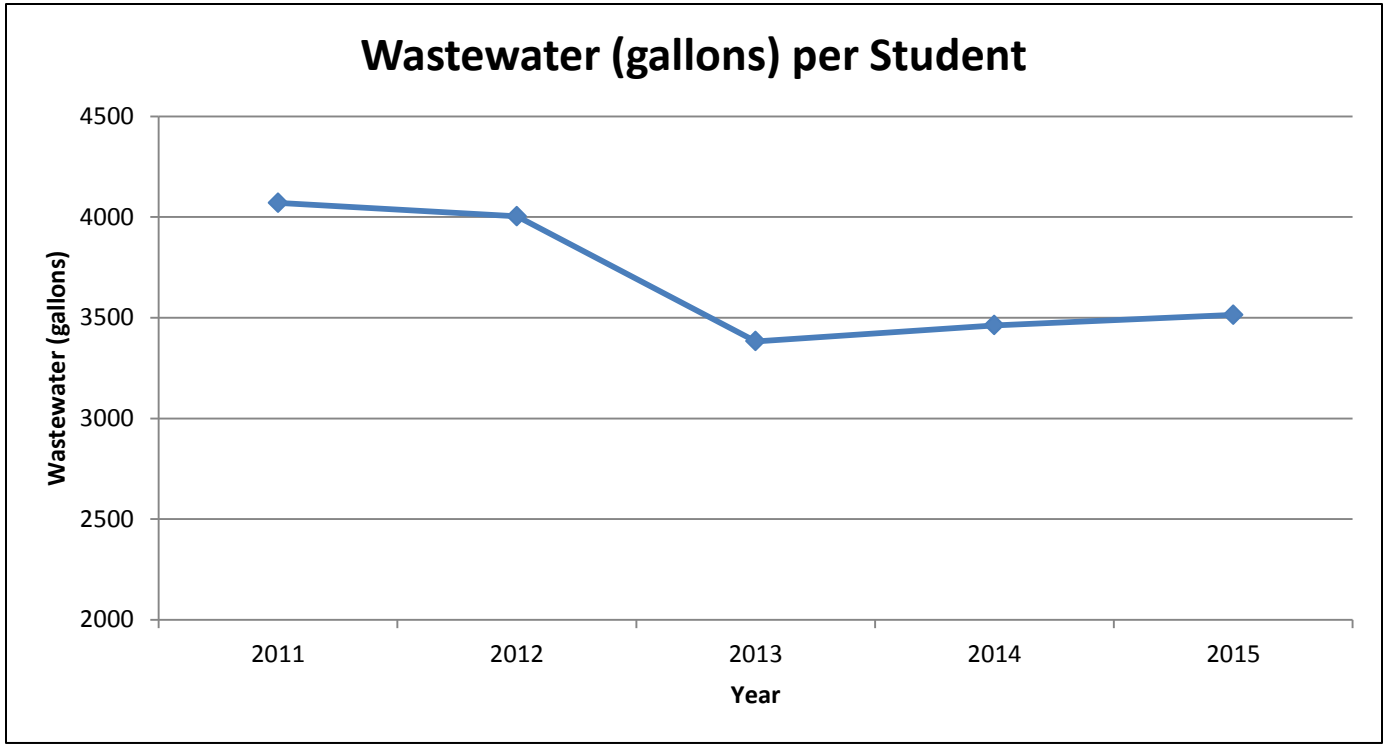
Permaculture Garden



Water Management

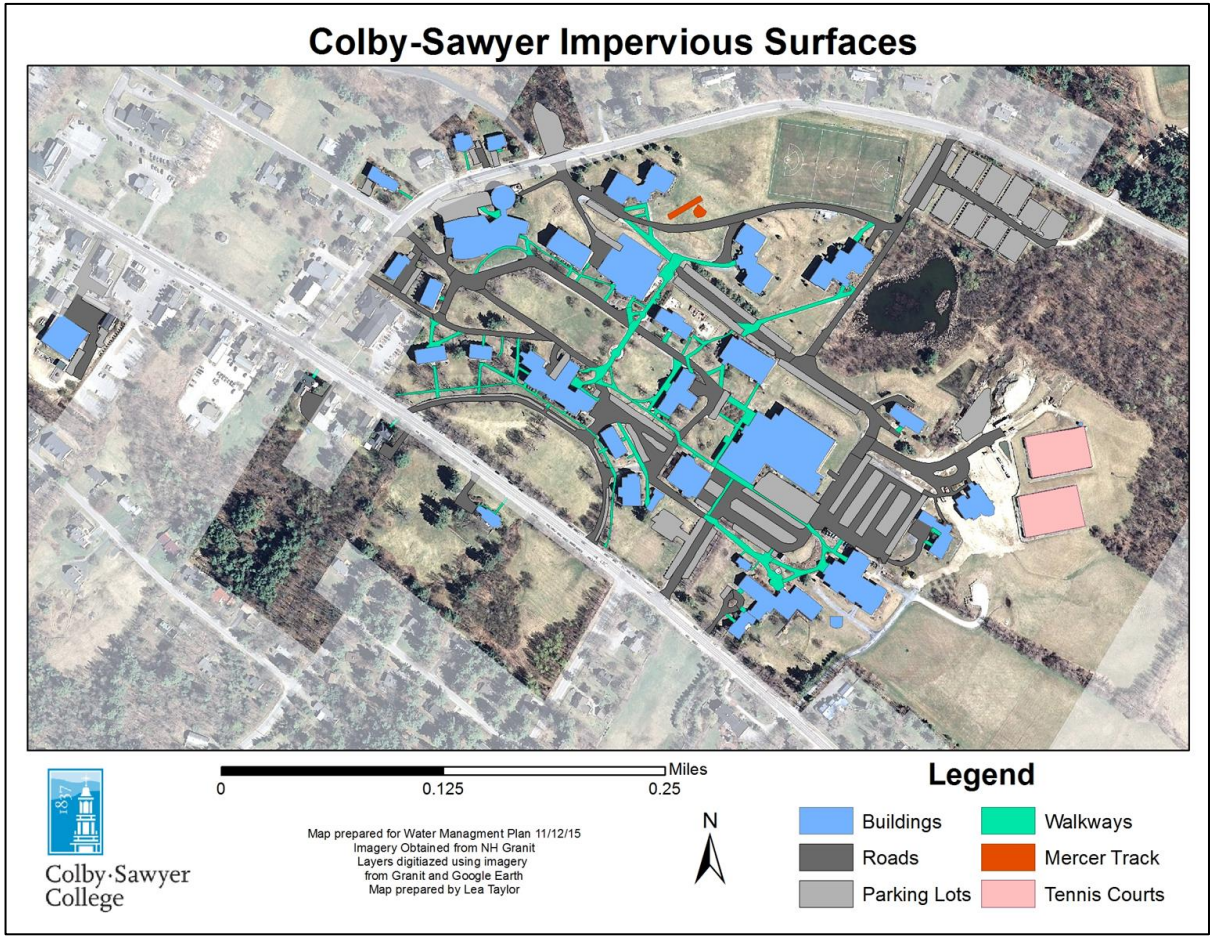


Water Management

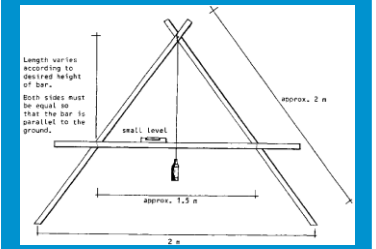


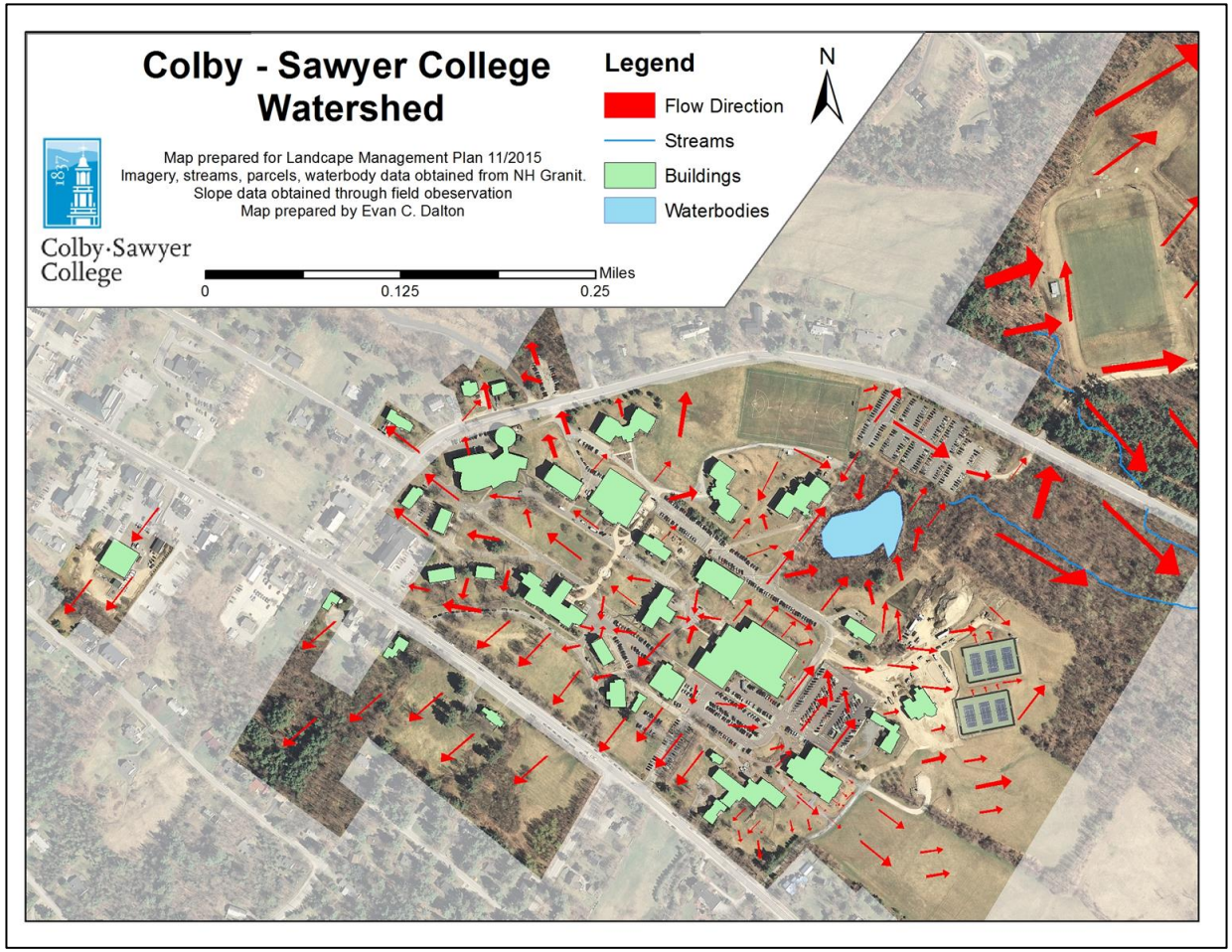
Landscape Surfaces

Impervious Surface	Area (in Sq. Ft.)
Buildings	284,824
Roads	429,487
Parking Lots	213,175
Walkways	86,950
Mercer Track (throwing field)	2,718.11
Tennis Courts	42,263
Total	**1,059,417**

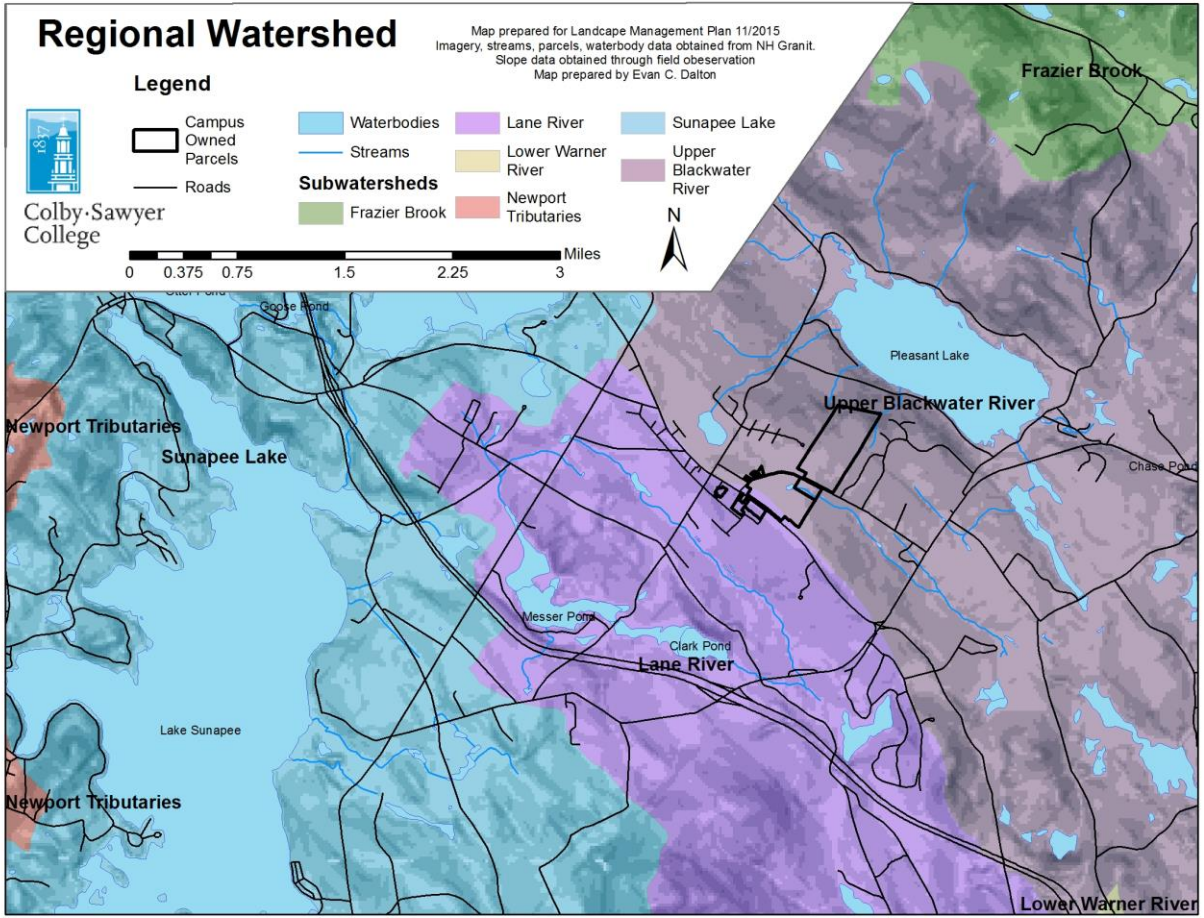


Direction of Water Runoff

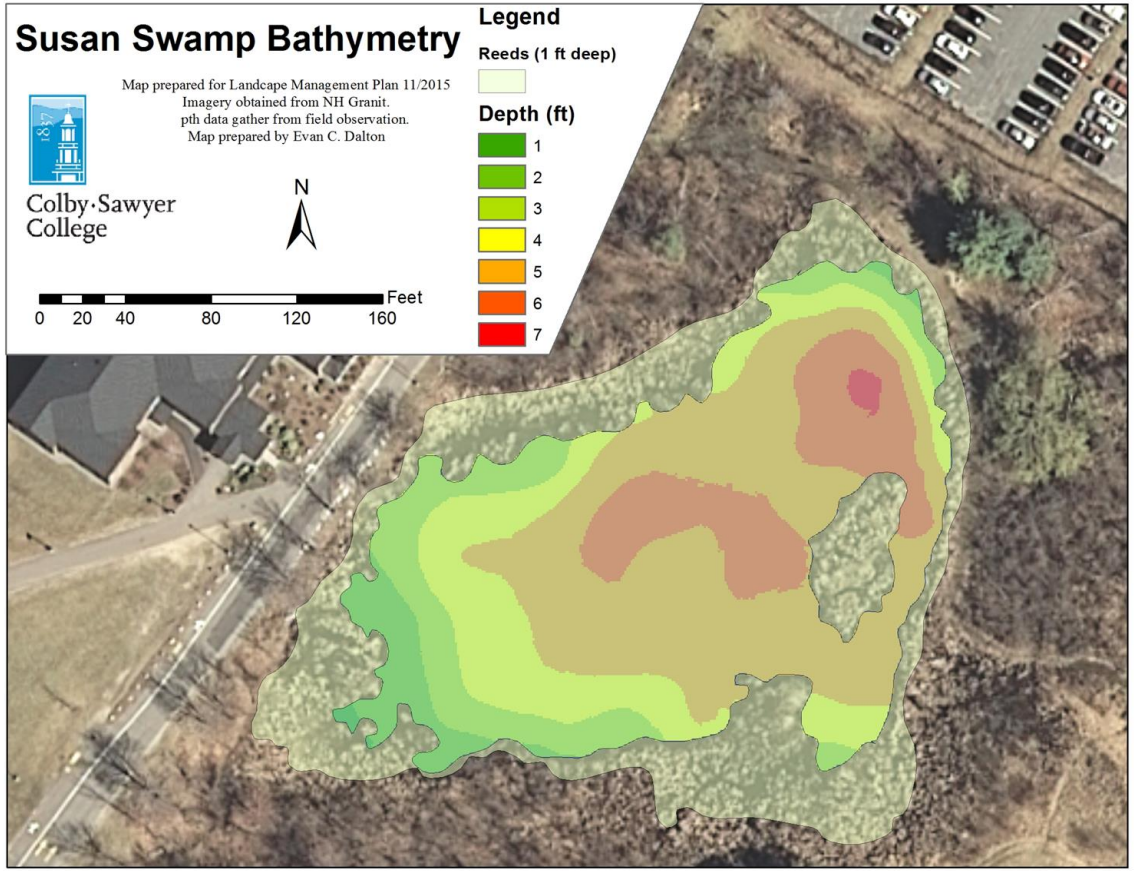




Water Management



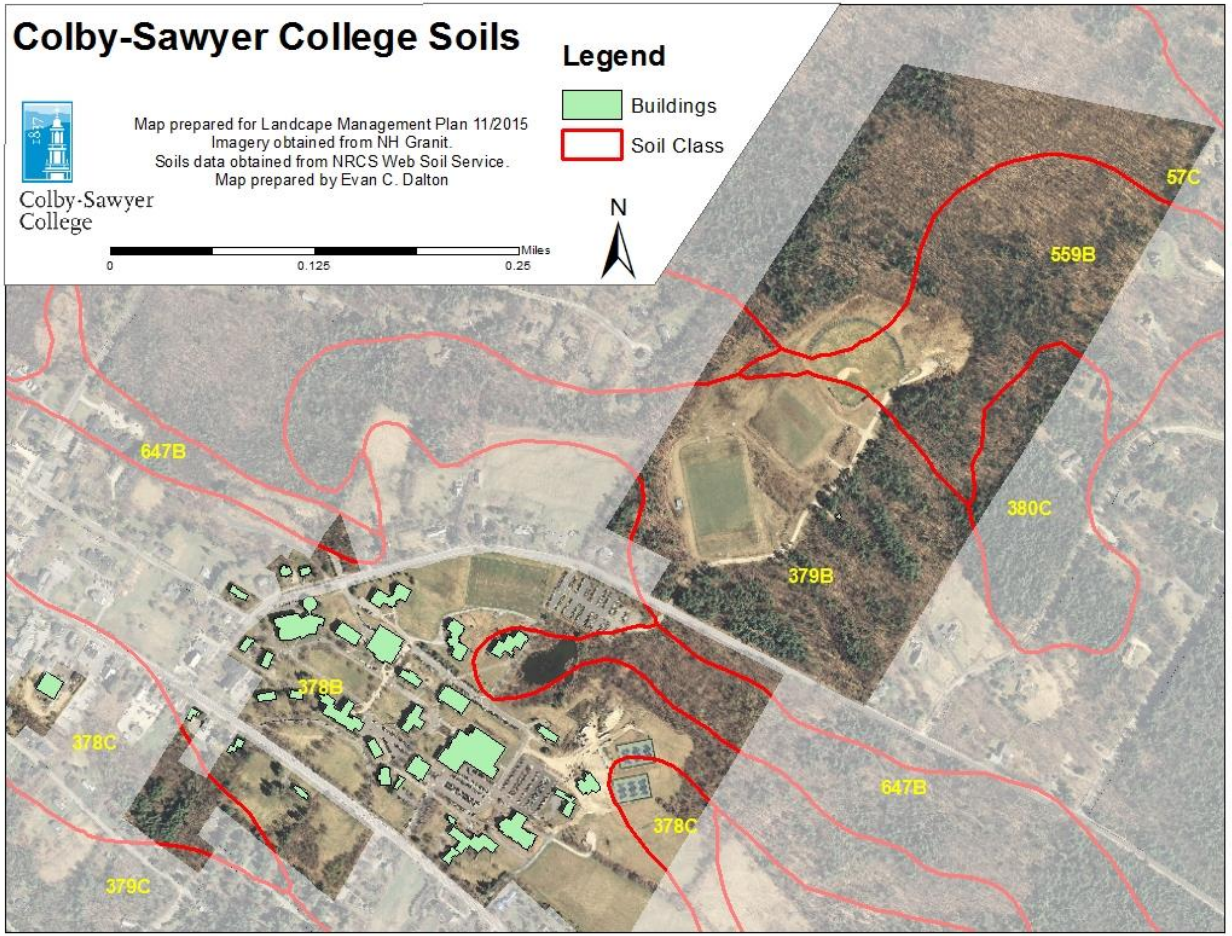
Water Catchment



Susan's Swamp Physical & Chemical Characteristics

Sample	pH	Conductivity (µS/cm)	Turbidity (ntu)	Physical Description	Alkalinity (mg/l)
Center	7.75	695	6.6	Medium brown color, Heavy organic matter, Medium sediment	309.2
Road-side	6.99	668	8.69	Light brown, color, Medium organic matter, Light sediment	
Launch Site	6.99	681	11.0	Light brown color, Medium organic matter, Medium sediment	
Launch Site Replicate	7.00	678	10.3		

Soil Types


Colby-Sawyer College Soils
Legend
Buildings
Soil Class
Map prepared for Landcape Management Plan 11/2015
Imagery obtained from NH Granit.
Soils data obtained from NRCS Web Soil Service.
Map prepared by Evan C. Dalton
Colby-Sawyer College
N
Miles
0
0.125
0.25
57C
559B
647B
380C
379B
378B
378C
647B
378C
379C

Forest Management

Forest Management









Natural History



Hurricane damage



Ice damage





Land Use History



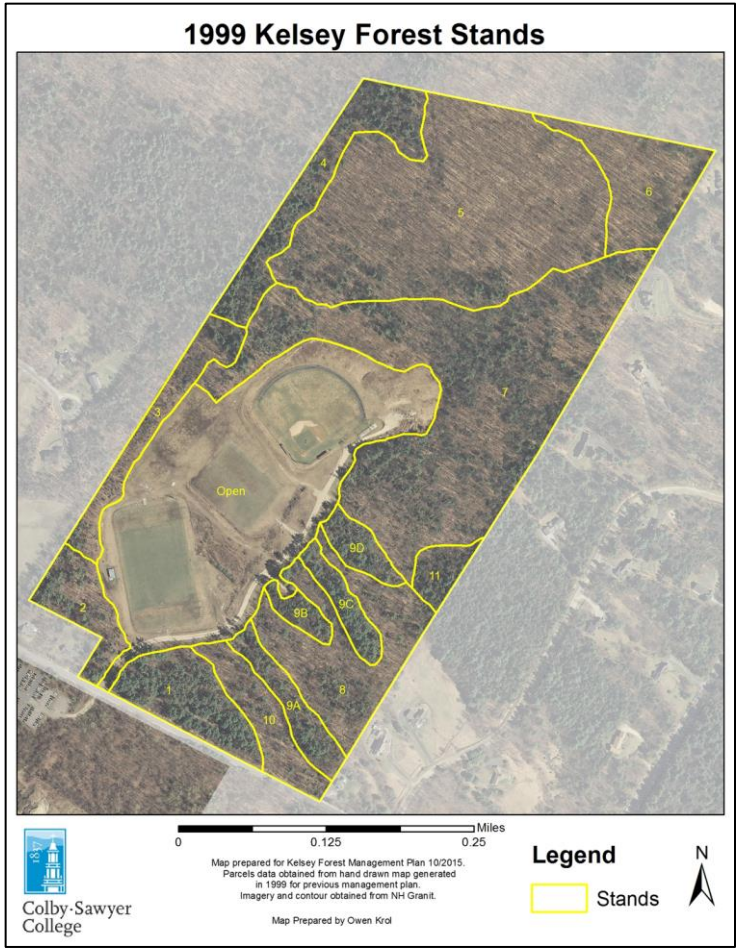


Forest Management

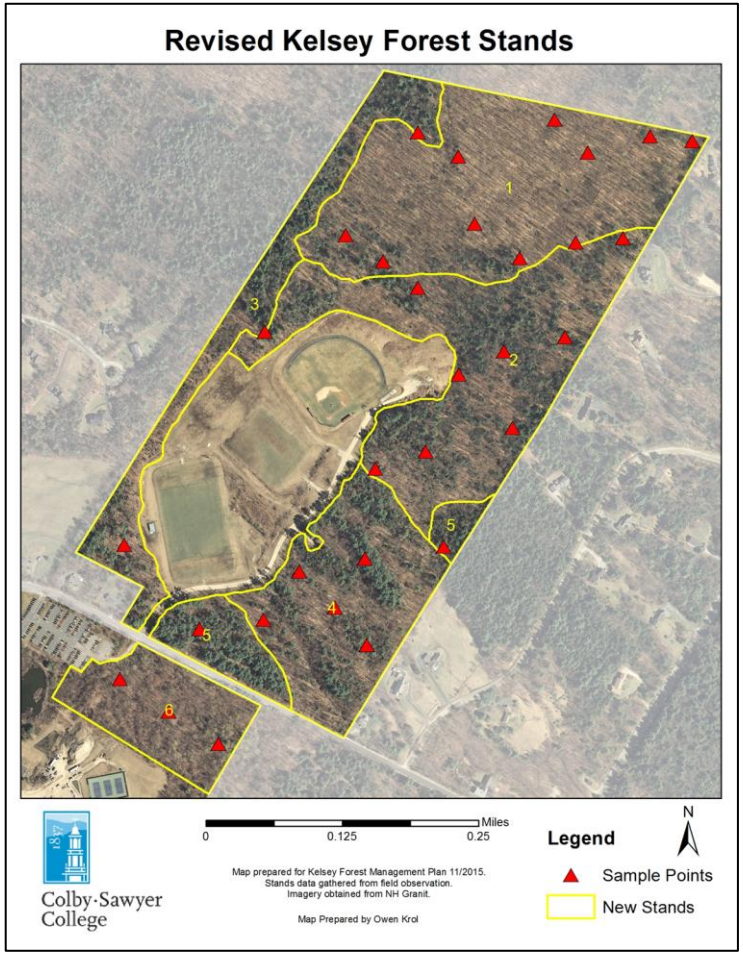
A FOREST STEWARDSHIP PLAN
COLBY-SAWYER COLLEGE
WOODLOT
NEW LONDON, NH
MAY, 1999

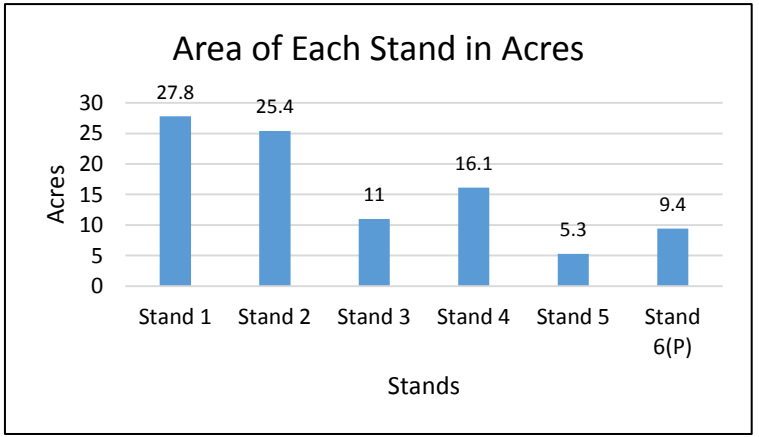
REVISED & AMENDED
SEPTEMBER, 1999

prepared by
PIERRE J. BEDARD, L.P.F. # 98
Wilmot, NH 03287

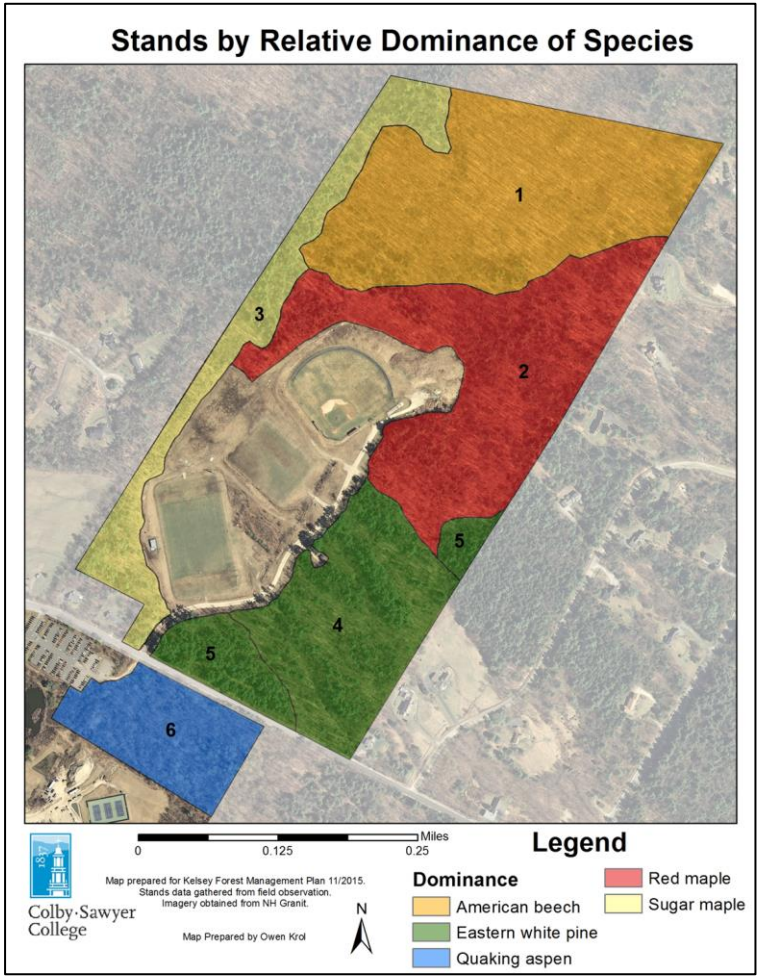


Forest Stands





Forest Stands



Forest Stands

Total Pulpwood in each Stand	
Stand	**Total Pulpwood (cords)**
Stand 1	500
Stand 2	381
Stand 3	187
Stand 4	161
Stand 5	42
Stand 6(P)	56
Total	**1,327 cords**

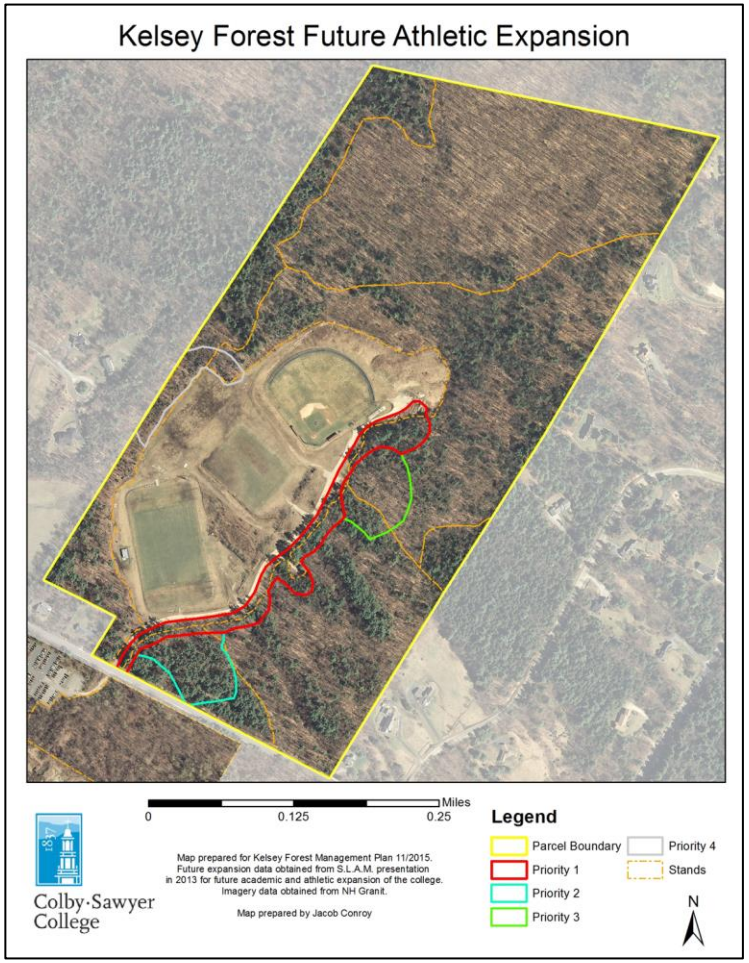
Total Sawtimber in each Stand		
Stand	**Relative Dominance**	**Total Sawtimber (Board Feet)**
Stand 1	American Beech	168,496
Stand 2	Red Maple	101,397
Stand 3	Sugar Maple	83,347
Stand 4	White Pine	161,081
Stand 5	White Pine	48,447
Stand 6(P)	Quaking Aspen	8,761
Total	----------	**571,529 Board ft**

Forest Stands

Total Carbon Storage in each Stand	
Stand	**Total Carbon Storage (tons)**
Stand 1	1,513.3
Stand 2	1,061.2
Stand 3	670.7
Stand 4	699.4
Stand 5	181
Stand 6(P)	151.7
Total	**4,277.2 tons**

Total Biomass in each Stand	
Stand	**Total Biomass(in tons)**
Stand 1	2,645.45
Stand 2	1,909.01
Stand 3	1,339.3
Stand 4	1,281.4
Stand 5	295
Stand 6(P)	303.4
Total	**7,773.56 tons**

Kelsey Forest Developments



Priorities

#1: Increase in Parking

#2: Tennis Courts

#3: Artificial Softball Field

#4: Track and Field Throwing Area

Stand Overlap

Stand 2: 2.84 acres

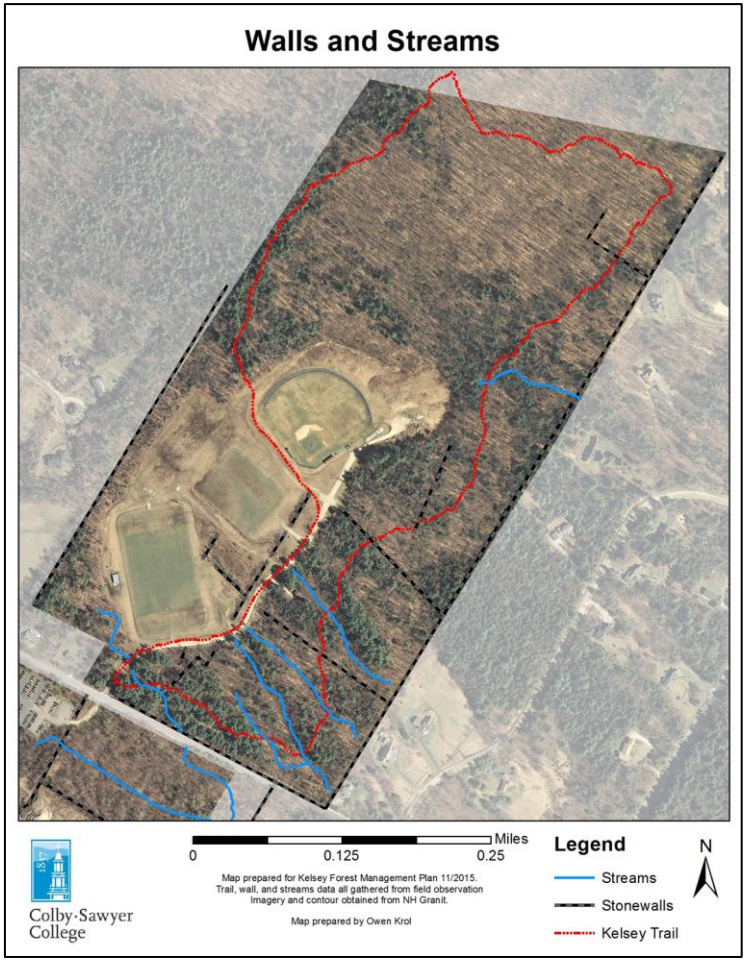
Stand 3: 0.94 acres

Stand 4: 1.85 acres

Stand 5: 2.41 acres

Total Expansion: 8.04 acres

Miscellaneous Data/GIS



Other GIS components gathered include streams, stone walls, contour, and slope.

Residents of Kelsey Forest







Mammals:

American black bear *(Ursus americanus)**
Bobcat *(Lynx rufus)*
Eastern chipmunk *(Tamias striatus)**
Eastern pipistrelle *(Perimyotis subflavus)*
Eastern red bat *(Lasiurus borealis)*
Fisher *(Martes pennanti)*
Flying squirrel *(Glaucomys sabrinus)*
Gray fox *(Urocyon cinereoargenteus)*
Hoary bat *(Lasiurus cinereus)*
Moose *(Alces alces)*
Northern long-eared bat *(Myotis septentrionalis)*
Opossum *(Didelphimorphia)*
Raccoon *(Procyon lotor)*
Red squirrel *(Tamiasciurus hudsonicus)**
Silver haired bat *(Lasionycteris noctivagans)*
Striped skunk *(Mephitis mephitis)*
White-tailed deer *(Odocoileus virginianus)**

Birds:

American crow *(Corvus brachyrhynchos)**
American woodcock *(Scolopax minor)*
Barred owl *(Strix varia)**
Black-throated blue warbler *(Setophaga caerulescens)*
Canada warbler *(Cardellina canadensis)*
Common raven *(Corvus corax)**
Coopers hawk *(Accipiter cooperii)*
Downy woodpecker *(Dryobates pubescens)**
Eastern wood-pewee *(Contopus virens)*
Hairy woodpecker *(Picoides villosus)**
Northern goshawk *(Accipiter gentilis)*
Ovenbird *(Seiurus aurocapillus)*
Pileated woodpecker (*Dryocopus pileatus*)*
Purple finch *(Haemorhous purpureus)*
Red eyed vireo *(Vireo olivaceus)*
Ruffed grouse *(Bonasa umbellus)*
Veery *(Catharus fuscescens)*
White-breasted nuthatch *(Sitta carolinensis)*
Wild turkey *(Meleagris gallopavo)**
Wood thrush *(Hylocichla mustelina)*

* indicates directly observed species

Residents of Kelsey Forest



Funding Opportunities

SUSTAINABLE FORESTRY INITIATIVE

SFI-00001

NHSFI has expressed interest in our project

We will be discussing the project further with them and potentially obtain funding to offset costs

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Next Steps

Thank You