

# Mutualistic Occupation

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**Currently there are approximately 109 million acres of Wilderness in the United States of America. While this area continues to grow, so too does the impact of population growth and visitation to these protected lands. Furthermore the budget for the national forest service is rapidly being consumed by the fighting of forest fires putting a significant strain on other maintenance of these lands and reducing the capacity for public education. This paper presents the pedagogical framing and student design projects that respond to the following: Can our occupation and enjoyment of these places shift from the mentality of “leave no trace” to one of mutualistic benefit? Can our presence within the Wilderness improve the sustainability of both the ecosystem and the economic system that supports it? The paper evidences design proposals that use the desired inhabitation of the Wilderness as a mechanism to improve the ecosystem through our occupation. The student projects presented here leverage opportunities within existing systems to propose an architecture of mutualistic occupation.**

“Far from being the one place on earth that stands apart from humanity, it is quite profoundly a human creation”

—William Cronon

## CONTEXT

In 1891 Congress passed the Forest Reserve Act that allowed the President to “set apart and reserve ... public land bearing forests ... or in part covered by timber or undergrowth, whether of commercial value or not, as public reservations.” These forests were set aside not just for the protection of timber, but as a way to “preserve the fauna, fish and flora of our country, and become resorts for the people seeking instruction and recreation” as noted in the 1891 Interior Annual Report by the Secretary of the Interior John Noble.

While land was being reserved as National Forest, it was not until the Forest Service Organic Administration Act of 1897 designated funds and management provisions to oversee these forests. These lands were then further defined with the creation of the National Parks which placed restrictions on the use of the land for its natural resources and placed a higher level of preservation of the ecosystem for future generations but still maintained the mission of allowing for the enjoyment of these places.

In 1964 the 88th Congress enacted the Wilderness Act to further define uses and roles of specific areas within the National Forest. The Act describes wilderness as follows:

“...lands designated for preservation and protection in their natural condition...” Sec 2(a)

“...an area where the earth and its community of life are untrammelled by man...” Sec 2(c)

“...an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvement or human habitation...” Sec 2(c)

“...generally appears to have been affected primarily by the forces of nature, with the imprint of man’s work substantially unnoticeable...” Sec 2(c)

“...has outstanding opportunities for solitude or a primitive and unconfined type of recreation...” Sec 2(c)

“...shall be devoted to the public purposes of recreation, scenic, scientific, educational, conservation and historic use.” Sec 4(b)

The designation of these legal protections, and numerous others, evidences our awareness of the importance of these places and our need to protect them for us and future generations. The National Forest Service has set the following as its Strategic Plan:

Sustain Our Nation’s Forests and Grasslands.

Deliver Benefits to the Public.

Apply Knowledge Globally.

Excel as a High-Performing Agency.

This Strategic Plan includes the Wilderness areas and indicates that one of its key roles is to disseminate methodologies to sustain these ecosystems.

Currently, there are approximately 109 million acres of Wilderness in the U S, and it continues to grow each year. Approximately 5% of the US lands are designated as Wilderness, but only 2.7% in the contiguous US as Alaska contains almost half of the designated lands. Montana specifically has 15 designated Wilderness areas that make up 3.7% of the total acreage of the state. [2] These Wilderness areas contribute to the draw of tourists to enjoy what Montana has to offer.

In 2016 Montana had 12.4 million visitors in a state with just over 1 million residents, an increase of 2 million visitors over the last 6 years. Non-resident spending in 2016 exceeded \$3 billion, two-thirds of which occurred around Glacier and Yellowstone National Parks. [3] Adjacent to the National Parks are also significant areas of National Forest which include the majority of Wilderness area in Montana. The Bob Marshall, Scapegoat, and Great Bear Wilderness areas around Glacier make up the third largest contiguous Wilderness area in the lower 48 states with 1.5 million acres. The Absaroka-Beartooth and Lee Metcalf Wilderness areas

around Yellowstone form almost 1.2 million acres. [4] These Wilderness areas have become increasingly more accessible as the infrastructure for tourism in Montana has increased to meet the growing demand for people to experience these places.

As we continue to see increases in population in the state of Montana and increases in recreational use of the National Forest the importance of the need to properly manage these places significantly grows. However, the relationship between use and budget continues to be an issue as does the education of the people that use the National Forest system. The budget for the national forest service is rapidly being consumed by the fighting of forest fires, shifting from 16% of the budget in 1995 to 52% in 2015. By 2025, projections place the budget at two-thirds, putting a significant strain on other maintenance of these lands and limiting the ability for the Forest Service to educate the public. [5] The goals of the Forest Service and the desires of people to enjoy these places can be oppositional, as with any occupation of a place even the most conscientious visitor does some level of harm to the ecosystem. We can look to the increasing visitation of these lands, growing at a faster rate than population growth, and ask the question “are we loving these places to death?”

	BLM	National Park	Wilderness
<b>Mission Statement</b>	To sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations	To preserve the natural and cultural resources and values of the National Park System for the enjoyment, education, and inspiration of this and future generations	Recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain
<b>Access</b>	Unless restricted by area: Roads, Trails, Boardwalks, Structures, Installations, and Temporary Roads can be used.	Roads, Trails, Boardwalks, Structures, Trails, Installations, Temporary Roads	
<b>Fire Approach</b>	Excess of 3,000 full-time equivalent firefighting personnel	Fire management (managers, weather specialist, firefighters, engine captains, crew superintendents, battalion chiefs)	Fire suppression
<b>Mechanization</b>	Vehicles, Bicycles, Hang Gliders, and Machinery unless restricted by area designation.	Vehicles, Bicycles, and Machinery	Motorized equipment and mechanical transport are not permitted
<b>Etiquette</b>	Defaults to either wilderness area, national monuments, and other protected areas.	Leave everything as you found it, use pullouts, stay on trail	Leave No Trace (LNT) techniques
<b>Building Codes</b>	International Building Code (IBC) 2015, with Appendices International Existing Building Code (IEBC) 2015, with Appendices	Contemporary alterations and additions to a cultural landscape must not radically change, obscure, or destroy its significant spatial organization, materials, and features	No structures unless the structure was in place before area was designated wilderness or the structure is an extension for environmental management
<b>Accessibility</b>	All practicable efforts will be made to make facilities, programs, and services accessible and usable by all people	Access Pass, Service Animals, Camping, Trails, and Vistas	No agency is required to provide any form of special treatment or accommodation or to construct any facilities or modify any conditions of the lands within a wilderness area to facilitate such use
<b>Food Storage</b>	Car, food lockers, campgrounds, hotel, tent cabins, and hanging from a tree	Food lockers, campgrounds, hotel, and hanging food from a tree	Hanging from a tree
<b>Hunting</b>	Hunting is illegal in most parks and many wildlife refuges	No, hunting is illegal	Yes, a person may hunt in a wilderness area unless it is within a national park
<b>Intent</b>	To manage, protect, and improve	For the enjoyment and education	To protect open space, watersheds, natural soundscapes, diverse ecosystems, and biodiversity
<b>Language</b>	Administer, Govern, Assure, Defend, and Enhance	Gratification, Joy, Luxury, and Learning	Solitude, Primitive, Spiritual Values, and Inspirational

Figure 1: Comparison of National Land designations developed by Darren Brown and Andrew Clark



## SITE

The Lee Metcalf Wilderness, established as part of the National Wilderness Preservation System in November 1983, consists of 259,000 acres distributed across the Madison Range in southwest Montana in the Gallatin and Beaverhead-Deerlodge national forests. The Wilderness is comprised of four separate units with three being managed by the Forest Service and one by the Bureau of Land Management. The Spanish Peaks Unit of the Lee Metcalf Wilderness is 76,000 acres located to the west of U S Highway 191 with approximately 13 miles of its border within a mile or less of the highway. Within this Wilderness area is Lava Lake, a high mountain lake located approximately 3 miles and 1,600 vertical feet from the trailhead access off US 191. The lake is 47 acres and is heavily used by anglers, day hikers, and overnight campers. Because of its ease of access and being one of the most accessible lakes in the Wilderness area it sees significant visitation and is one of the most recommended hikes for visitors to the region. This trailhead, trail, and destination were utilized as the site for a summer design studio at Montana State University where students explored the implications of architecture within the context of Wilderness and economics.

## STUDIO PROMPT

If Wilderness is defined as “an area where the earth and community of life are untrammelled by man, where man himself is a visitor who does not remain” and “an area of undeveloped Federal Land retaining its primeval character and influence, without permanent improvements or human habitation”, what role can architecture play given these parameters?

This very notion of Wilderness as primeval and a place untrammelled by man is an outdated mentality as no place is without the significant influence of human activity. All places are connected as a singular ecology and the actions of humans impact remote Wilderness regions. We can see this influence from global warming shifting species location, the influence of agricultural pesticides and fertilizers that impact bee populations or development that shifts migration patterns. Technology has also changed the condition as we can now be connected to anyone using a satellite phone or sometimes even our regular mobile phone will pick up a signal, tethering us back to the city while we are having a “primeval” experience. We also see it in the increase in forest fires due to the location of development and the management of fires for the last century, a management strategy that prioritizes the protection of human investment and structures. What should our role be in the protection of these lands as the Wilderness Act does specifically state that Wilderness “is protected and managed so as to preserve

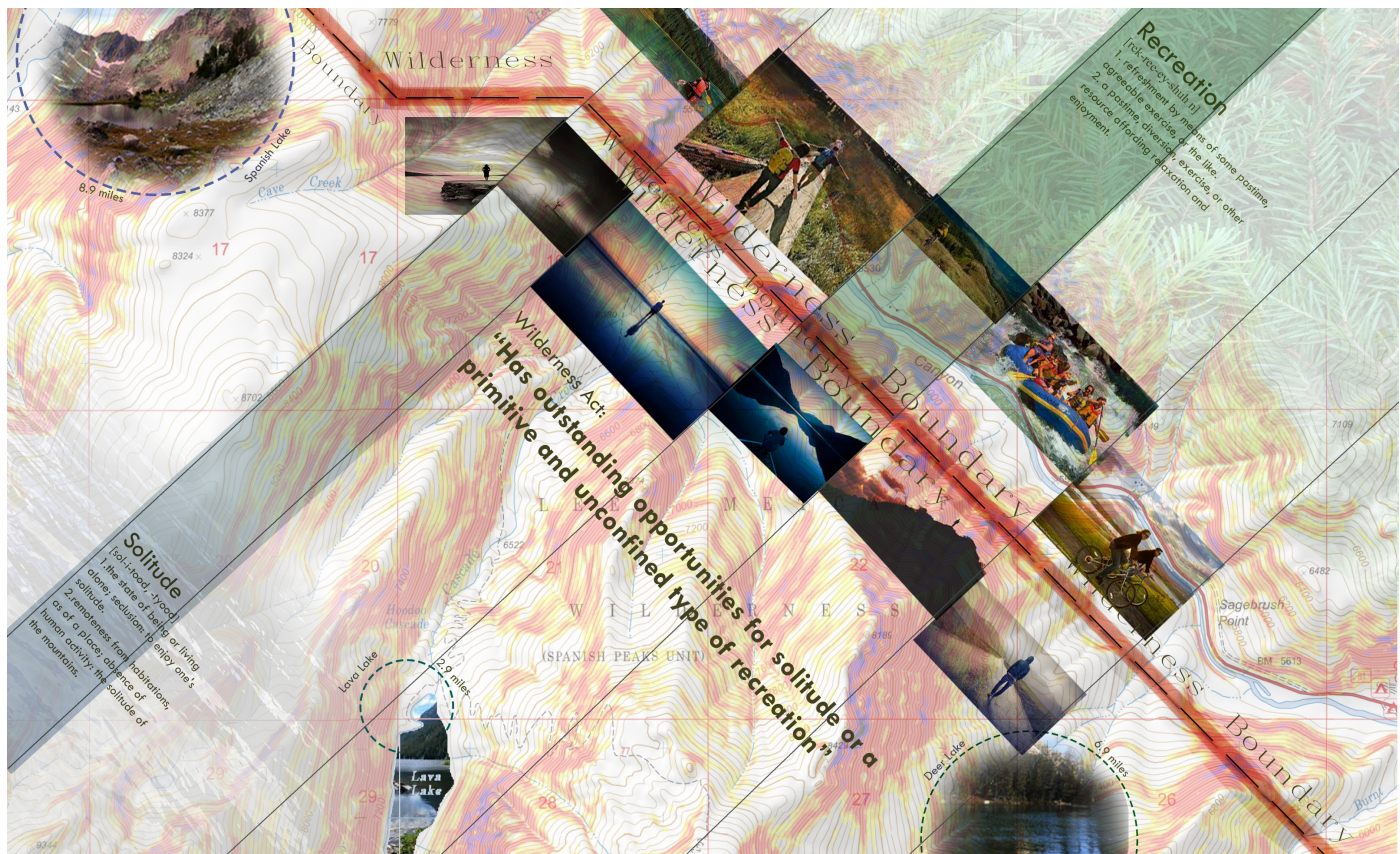
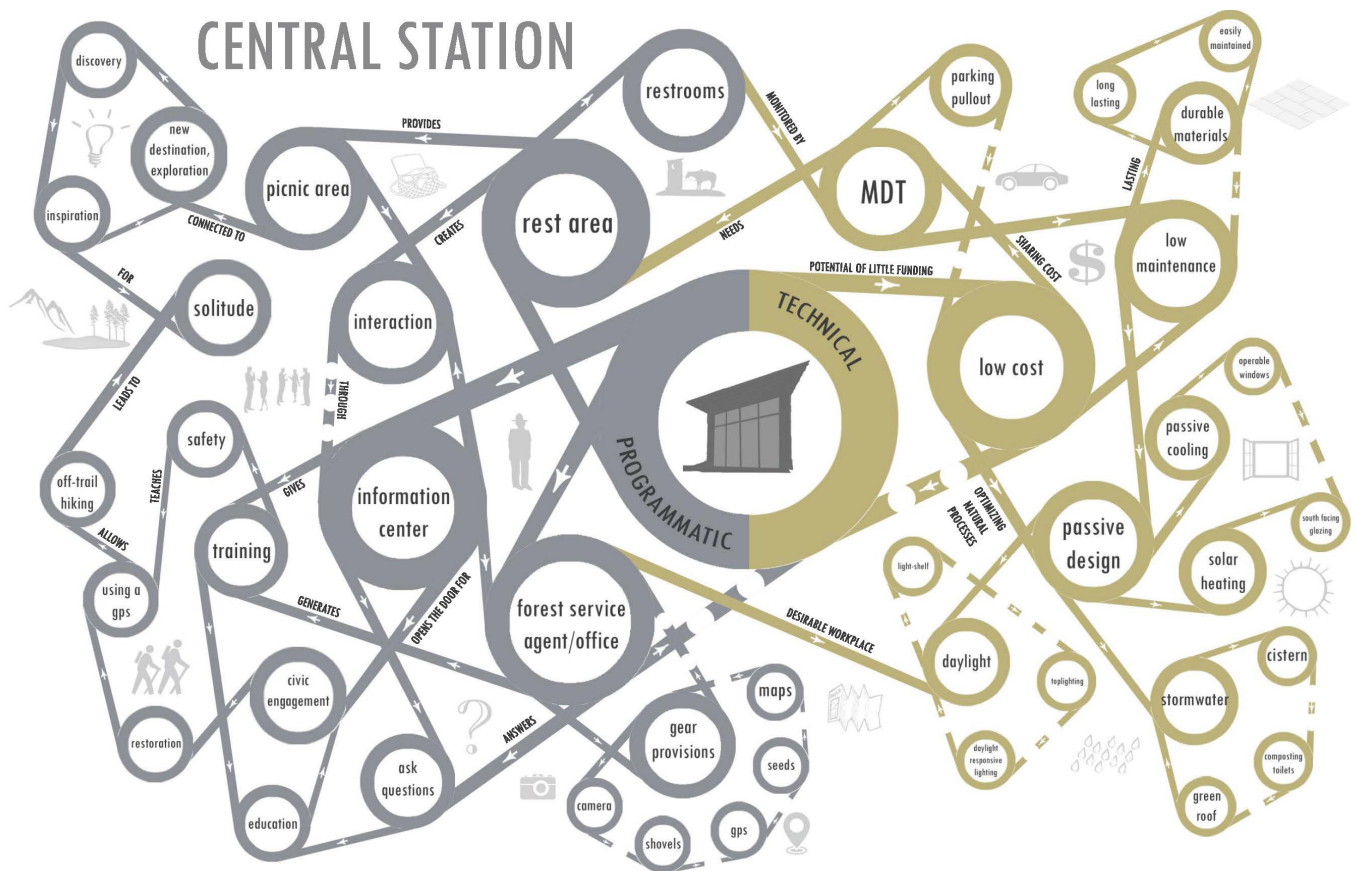


Figure 2: Mapping the Wilderness Boundary by Heather Bing.

The premise of the studio starts with the following questions: Can our occupation and enjoyment of these places shift from the mentality of “leave no trace” to one of mutualistic benefit? Can our presence within the Wilderness improve the sustainability of not just the ecosystem, but the economic system that supports it? Can a model of a public-private partnership be utilized as a way to further fund the needs of the Forest Service and perhaps create a new model for our occupation of Wilderness? The goal of this project is to use the desired inhabitation of the Wilderness as a place of retreat as a mechanism to link into larger systems and seek to improve the ecosystem through our occupation. These projects seek to leverage opportunities within existing systems to propose an architecture of mutualistic occupation.

Students began their investigation by doing the things one does at the start of any project to set the framework for design. We drove out to the trailhead, hiked up to the lake, explored the area taking photos, sketches, and notes, and then returned to the studio to develop research. The studio discussions raised significant questions about our relationship to Wilderness and if the language of the Wilderness Act is still appropriate today. Can we have a primitive experience when we are wearing clothing and carrying gear that rivals that of the space program being developed at the time of the Wilderness Acts writing? Furthermore, can we build structures or manipulate the terrain within Wilderness without disrupting the intentions of Wilderness? While the first question remains an ongoing discussion, the second is addressed in the language of the Wilderness Act as it states that structure can be built in Wilderness if



it “is an extension for environmental management.” The studio took this notion of management beyond maintenance of the place and looked at it as a larger management of the Wilderness for its long term sustainability.

very hesitant to build or manipulate anything. They also struggled to understand the difference between their client (the Wilderness) and the users (hikers, hunters, campers, etc.). The research developed through their programming did prove fruitful once they were able to clearly define the goals of the client and user and see where potential overlap occurred. This development led to a series of program diagrams that clearly articulated the existing systems and where there was opportunity to intervene by leveraging the desires of the users to provide a benefit to their client. The



programs developed by the students ranged from a minimal physical intervention with a strategic deployment strategy shifting forest service management to intensive structures built within or at the edge of Wilderness and a reworking of highway infrastructure. The following are four of the student proposals.

## PROPOSALS

Student Jessica Proctor examined the role of fire in primitive experience and determined that this was the most significant element of the primeval wilderness as it connects us to our ancestors. She coupled this with the increasing budget use for fighting forest fires and the restrictions on open fires due to the increasing scale of destruction from recent fires. This increase in the scale and destruction is due to management strategies that have not allowed small fires to burn on a regular basis resulting in more dead wood as fuel. Understanding that removing all of the extra dead would be a massive undertaking she identified zones of natural fire break locations at rivers and ridges and set these as her site. If the fuel load were reduced at these areas the fires would slow as they approached the break and the natural conditions could stop the spread of fire. By doing this the fires are allowed to burn, resetting that area that could be managed in a new way and allowing the natural regrowth process to occur. Her proposal leverages both the desire and need of a campfire for campers and hikers to reduce the fuel load at these natural breaks. Rather than extending the resources of the Forest Service, she proposed that campfire rings would be strategically placed in these locations and Wilderness users would gather the fallen wood close to the fire rings. The Forest Service would then move the rings along these natural breaks as the excess fuel load in one location is satisfactorily reduced.

Heather Bing examined the relationship of writing about Wilderness as a means of promoting the use of Wilderness and advocacy for its protection. She also examined the relationship of the Wilderness designation, a line drawn on a map not typically related to the terrain, and the difference of being on one side or the other. Her intervention, located one mile south of the Lava Lake trail along the Wilderness border, created a writing retreat and paper making studio at the border outside of Wilderness. Her proposal coupled sustainable forest management of tree harvesting, forest thinning and reforestation with the act of making paper and providing all of the energy needed for the facility. Her deployment of interventions maintained a rigorous geometry within the steeply sloped site constantly bringing the user to the boundary, this line on a map, without ever allowing one to physically cross into Wilderness. Her strategy calls into question our relationship to legal designations and ecological realities as the activities on one side impact the other, both physically and emotionally.

Andrew Clark focused his research on species that are indicators of the health of the overall forest system and how our intervention in the forest could promote the success of these indicator species. Specifically he chose the difficult to sight Northern Goshawk as it plays a significant role in the Mountain West region. He leveraged

the bird's elusive character to create a strategy of dispersal for hikers to promote a diversity of locations as destinations within the Wilderness, reducing the impact of visitors to the singular location of Lava Lake. His interventions also employed strategies of the hypernatural, looking at ways of enhancing the desired habitat for the Goshawk and extending its opportunity for hunting and nesting. The strategy leverages research interest and citizen desire to create a series of small gathering shelters as warming huts and blinds for observing the bird. The shelters are constructed with rammed earth and utilize passive ground source heat exchange to not only warm the shelter, but to extend the growing season of the hunting habitat for the Goshawk.

Tia Hanson identified winter use within this region as an opportunity to promote reforestation and reduce the impact of avalanches as they are occurring more frequently due to global warming. She began with an analysis of avalanche prevention strategies and identified that they all require a significant economic investment. She identified an opportunity to fund this investment through backcountry shelters for skiers as the existing shelters within the forest are between 90-100% occupancy throughout the winter. By thickening the snow fence to create a shelter, the cost of the investment in avalanche prevention is offset by the rent. Furthermore, by strategically placing these shelters on barren slopes, avalanches are reduced allowing for natural reforestation to occur, further reducing avalanche damage in the region.

Finally, Mary Demro dissected the language of the Wilderness Act, specifically the term "untrammeled" as the departure for her work. The term untrammeled does not mean to not be stepped in, rather it means something that is unrestrained and not contained. As Howard Zahniser wrote in the Wilderness act it should "not be subject to human controls and manipulations that hamper the free play of natural forces". Through this language and research into sustainable hiking strategies she determined that with the increase in use of the Wilderness that a dispersal strategy could be employed to promote an untrammeled Wilderness. To do this she examined the current network of trailheads and the road that connects them Highway 191, a road with a significant amount of accidents and fatalities. The highway has been identified as an area of study for road safety by the Montana Department of Transportation and there are funds dedicated to increasing safety. As most roads in the mountains, it runs along the river with little to no mitigation of road pollution entering the water. Mary coupled the future investment in road safety with stormwater management to create a dispersed parking network through the canyon as a means of traffic calming and traffic pullouts to increase safety and eliminate trailheads. She further promoted the dispersal within the Wilderness through an education center and virtual network of opportunities for users to engage in restoration projects. Through the education center, hikers are given the opportunity to explore the Wilderness as citizen scientists promoting a better understanding of the Wilderness while also reporting to the Forest Service valuable information about the health of the forest.

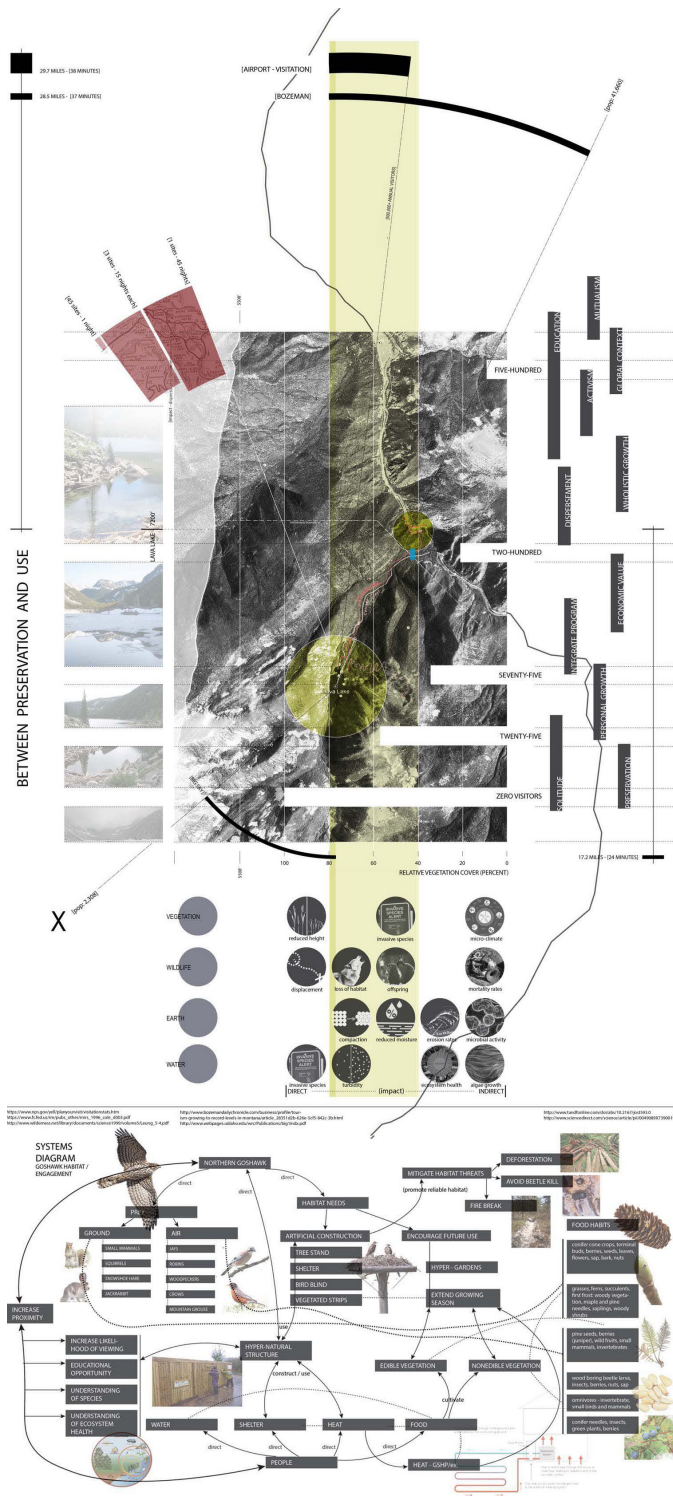


Figure 4: System Diagram and Mapping of the Northern Goshawk and Wilderness Interaction by Andrew Clark

## CONCLUSION

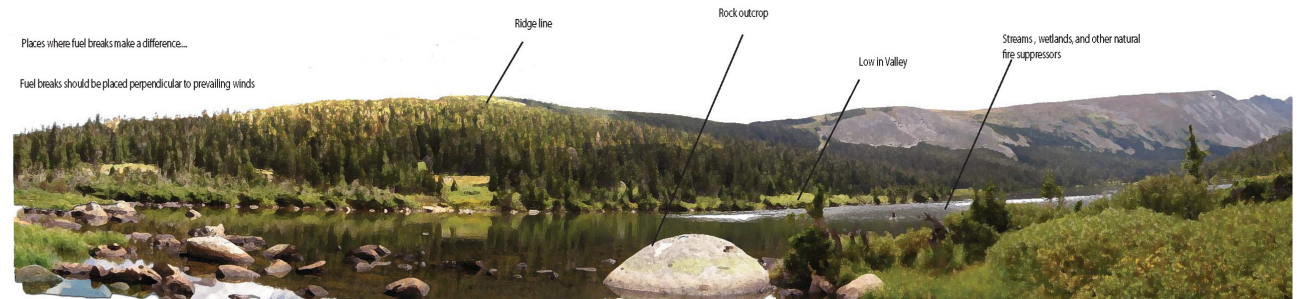
This studio engaged the students in a site and context that they are intimately connected to through recreational activity, yet see as outside of the realm of architecture. The research challenged them to examine the implications of language and legal designation and its

implications to the built environment and our occupation of these places. It also asked the students to dissect assumed values and parameters for our occupation through a critical lens that required them to examine the intention and not the general assumption of legal descriptions. The studio also allowed the students to discover the role of the user and the client in a project and that they often have different agendas and it is the role of the architect to find the overlap in both program and design. Through research students realized that opportunities for design intervention could be found through systems analysis and not by a given program. It also challenged them to expand their understanding of the capacity of design and that it can be a catalyst for larger action.

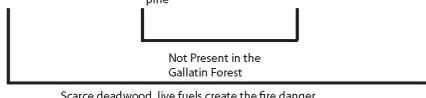
As the world is becoming more and more complex and we have a greater understanding of the interconnected nature of a global society the design challenges for future architects will expand beyond buildings as a place for inhabitants. Architecture will need to engage in a systemic analysis of the context to seek opportunities to leverage latent potential as a catalyst for larger influence. Projects that can understand the implications of their existence in a larger, rapidly changing context are more responsible and realistic. Projects of this nature also give a new agency to the designer who can manage the complexities of the context and provide value beyond the physical space. Students' understanding of system integration and program as an active condition informs the larger agenda of architectural education and the future of these particular students. A studio of this nature could have implications on a larger system-centric focus within the studio curriculum. This studio prioritized the understanding of design intervention as a strategy formed by research and evaluated on its performative characteristics relative to its benefits beyond the intervention and not the intervention itself. This approach to architecture has the capacity to move beyond minimizing our environmental impact to seek design strategies that truly are mutualistic in our occupation.

## ENDNOTES

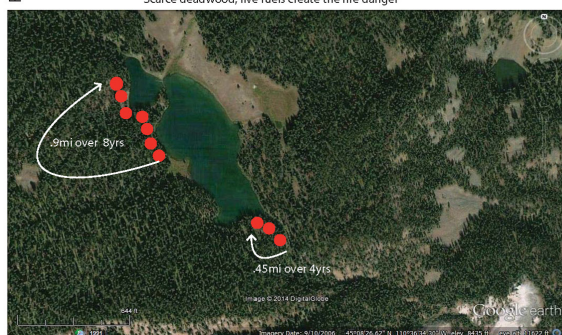
1. Cronon, William. *Uncommon Ground: Rethinking the Human Place in Nature*. (New York: W.W. Norton & Co., 1996. pg. 69
2. "Fast Facts About America's Wildernesses." Wilderness.net. Accessed November 13, 2017. <http://www.wilderness.net/NWPS/fastfacts>.
3. Grau, Kara, "2016 Economic Contribution of Nonresident Travel Spending in Montana Travel Regions and Counties" (2017). Institute for Tourism and Recreation Research Publications. 360.
4. "Wilderness.net." Wilderness.net. Accessed November 13, 2017. <http://www.wilderness.net/>.
5. United States Department of Agriculture. *The Rising Cost of Wildfire Operations: Effects of the Forest Service's Non-Fire Work*. (National Forest Service, 2015.)



Forest Habitat Types: Fire Groups



Dead loads are between 10-20tons/acre (413-826lbs/campsite), fire is not as important for seeding



Why these locations should be accessed for transportable campfire management?



most of the areas between 5-9 already use deadwood thinning techniques  
Some of the ecosystem are too delicate for fire machinery  
They make up a large parts of the wilderness area with no roads  
Avoids crown scorch occurring from prescriptive fire



a campsite would use the if used everyday of the season



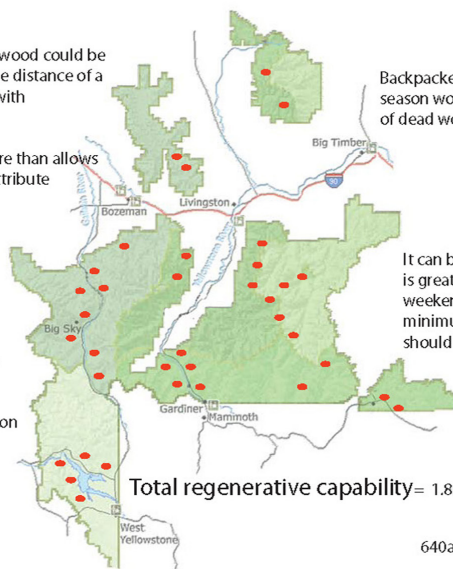
Rejuvenation of deadwood  
**3.8yrs-7.61yrs**

Increased fire size may influenced by bigger fire pits in areas where turn around length doesnt create a large enough fuel break or permit solitude

Backpacker's demand for fire wood could be satisfied sustainably within the distance of a football field (100yrd radius) with 162-324 roving camp fires.

With 1.8 million acres this more than allows for solitude to remain a key attribute

Greater concentration of people with less camp circles or higher than expected use estimates would end up reducing deadfall accumulation that feeds fires



Backpackers on a site for the full 120day season would use between 90-180lbs of dead wood

It can be assumed that there is greater use of the forest on weekends and that more than the minimum number of campsites should be established for peak days.



Creates a spiritual experience of tending fire.  
Reduces the building of permanent or semi permanent structures to hold fire.

13-26 nights of 1 bundle camping  
6-13 nights of 2 bundle camping  
from yearly production



Total regenerative capability= 1.8mil acres x 1/2ton/acre/yr = 900,000tons  
1/4ton/acre/yr= 450,000tons

640acres=1 mile  
.01tons/campsite/yr  
**20.6lbs/campsite/yr**  
.005tons/campsite/yr  
**10.3lbs/campsite/yr**

Figure 5: Dispersed Network of Fire Rings by Jessica Proctor