

CO-HABITATE

by

Meaghan Terese Evans

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of the requirements for the degree

of

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Meaghan Terese Evans

April, 2009

DEDICATION

I dedicate this thesis to Charlie Evans. He always wanted to be an Architect.

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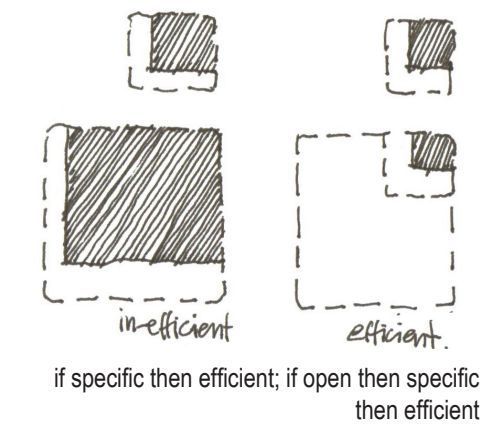
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ABSTRACT

This Thesis reinforces the natural characteristics in the zone of civilization's periphery and reverses the negative human impact on the natural world by developing a controlled experiential interaction between people and their environment. Explorations in spatial overlap, flexibility, and human activities resulted in three installations that define architectural space as a dynamic relationship between the human lifestyle, the dwelling unit, and its environment.

theory

This thesis reinforces the natural characteristics in the zone of civilization's periphery and reverses the negative human impact on the natural world by developing a controlled interaction between people and their environment. This thesis uses a set of internal values and external observations to drive design parameters. If the site is specific, then I am forced to design efficiently, if the site is not specific, then I will create appropriate parameters and design efficiently to those specifics. The teaching goal of this thesis is to promote the idea of co-habitation: people and the natural environment living together with respectful interaction that promotes health for both entities. The outcome will be a series of installations that define architectural space as a dynamic relationship between the human lifestyle, the dwelling unit, and its environment.



01theory

Each installation will be a reaction to an instance of visible human interruption of the natural system, promoting flexible design in the solution by adapting to the specific ecosystem it inhabits in order to heal the scars for future generations. Flexibility is also addressed by considering that each installation can fulfill certain human needs, such as shelter, solace, contemplation, and observation, but also buffering human impact from the surrounding natural environment. The far-reaching effects of my thesis will address the idea that by finding appropriate areas on the periphery of civilization, and by reinforcing the natural characteristics of those zones, we can replenish receded natural grain, thus reversing the trend that is diminishing natural areas at a rate that will lead to extinction of life on earth.



P01



P02

03theory

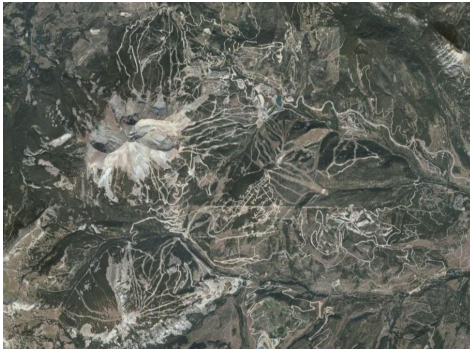
The human race has changed dramatically since its conception, and more than any other species, by its own collective will and innovation. Humans have always been driven by the power to succeed, by the need to be accepted by society, and the pure devotion to survival through food, shelter, and procreation. Throughout the years, humans have been left virtually unscathed and there has never been a time when our existence was truly threatened by another species. When we were pelted by the elements we built shelters and fires; when we were hunted by wild animals we built fences to keep them out. People continued to build these divisions between the natural world and ourselves to solidify our survival. With these practices building on themselves we built cities and thrived in the economic, social, and cultural centers. Although the progression and pace of the city has always been exciting for the human race, once it became clear that cities, true to form, excluded the natural environment, humans began to develop a new urge: the need to escape to natural places for solace, quiet and healing. The commute from the suburbs was a minor sacrifice for the victory of separating home from work and country from city:

“The company of men, the power of institution, the competition, stimulus, diversity and opportunity that the city represents are of a great value indeed, but the ancient memory insists upon a return to the land, as contrast, into the world of nonhuman creatures and things. This alternation is both necessary and good. The instinct of the caged animal to return to the wild seems to persist in that most domesticated of all animals—man.”
– Ian McHarg⁰¹

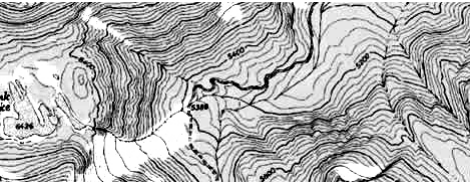


P03

theory04



Scars of unchecked development, Big Sky, Montana, P04



P05

05theory

As the world becomes more cultivated and technology gains us further allowance on our ties to the city, humans are finding it possible to take time off from their busy lives and vacation in natural, unpopulated areas. According to the U.S. Bureau of Reclamation, outdoor recreation in the United States is a \$350 billion industry, with approximately \$140 billion attributable to public lands and \$40 billion to public waterways. Recreation and travel combined is one of the world's largest businesses⁰². The human achievement of technology has given us the means to fill the craving we have to learn about new cultures and tread in native areas that boast the same characteristics of thousands of years ago, hardly touched by man. These pulls are instinctual, yet with the passion of curiosity, brings an undying urge to touch and feel and experience, consequently leaving a mark. As these areas of nature are recognized to meet an instinctual human need, inevitably they start to be marketed as a commodity. Aldo Leopold's Land Ethic gives us insight into the result of this shift of ownership:

"We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect. There is no other way for land to survive the impact of mechanized man, nor for us to reap from it the esthetic harvest it is capable under science, of contributing to culture."
-Aldo Leopold ⁰³

When land becomes a commodity, it is divided up and sold to individuals. Those individuals own the rights to use the resources on their land as they please. However, when land is separated into plots people can take for granted that “separation” and fail to consider that their plot is still a part of the whole surrounding ecosystem; they fail to respect that inevitably what one does with their property, affects their neighbor’s. Because of this area’s richness, the population in the Gallatin Valley has more than doubled since 1969.⁰⁴ Most of the influx are wealthy retirees that wish to stake a claim on their own piece of nature. Some have taken to the trend of building oversized and under-utilized homes in areas of rich natural resources in order to fulfill their need for solace, ignoring the negative impact their house makes on the surrounding ecosystems. These types of homes are built for many reasons including symbols of status, million dollar real estate investments, “primary” residence tax shields. However, this thesis will target the damaging actions of those that build a residence in areas of rich natural resources to celebrate their ownership of the land. The damage comes from the designs that use an incredible amount of resources through construction, interrupting fertile soil in excavation, and the amount of energy it takes to fulfill the commercial size heating, cooling, lighting, and water systems that are installed for use. The ecological and monetary footprint far exceeds the amount that these buildings are used to their fullest capacity, rendering them inefficient. Most are not used more than a couple weeks a year, yet the impact they inflict on the environment is irreversible. This thesis will offer an alternative to the vacation home by showing that connecting with nature in a controlled zone ensures the prosperity of both humans, and the natural world.



P06



P07



Goldsworthy interacts with nature in a way that makes us aware of the natural processes, such as the tide in this temporary installation of rock arches, P08.

07theory

In highlighting these steps towards ecological awareness, we must also admit that there is a necessity for balance in our land use policies. If we approach the conservation of natural resources in a way that establishes no human/nature interaction than we, as humans force ourselves further into a separation from nature, thus reducing our investment in the protection of the land. “Leopold’s assertion requires our presence in the land—an enlightened presence nonetheless. If nobody is there to love a place it will not necessarily be better for the absence.” (Stevens, 258)⁰⁵. We can infer from Leopold’s land ethic that symbiosis and co-habitation should be our goal. Symbiosis between nature and humans is reached through this thesis by choreographing an interaction that leaves humans with the calm and humility that nature’s beauty, silence, and contrast with the built environment brings. Nature will benefit from the symbiosis through the protection that the enlightned human provides, and the remediation they provide the areas that are damaged by misuse. The result is co-habitation: when an equilibrium is met and humans and nature can live and interact together in a way that does not harm either entity.

The current state of our land ethic is wildly unbalanced. A 2005 world wide study revealed that almost two-thirds of the active natural systems that support life on Earth are being degraded by human pressure.⁰⁶ It states if nothing is done, the human race will continue to consume to the point where our species and the approximately 10 million other species will not have the oxygen, nutrients, and habitat to survive. We have introduced our own and only natural predator, ourselves.

The challenge exists for humans to immediately start to dwell in a symbiotic relationship with the natural environments that support life on earth, thus supporting our existence and the perpetuity of Planet Earth. The immediacy stems from the fact that new generations are statistically further and further removed from interactions with nature. Many children are totally submersed in the urban core and through lack of proximity to truely natural areas, they have developed no respect for it.

Richard Louv’s book, Last Child in the Woods, Saving our Children from Nature Deficit Disorder, is an attestation to the newly recognized problem with today’s youth. “In this influential work about the staggering divide between children and the outdoors, child advocacy expert Richard Louv directly links the lack of nature in the lives of today’s wired generation—he calls it nature-deficit—to some of the most disturbing childhood trends, such as the rises in obesity, attention disorders, and depression.” ⁰⁷

Louv introduces a dialogue about the necessity to have a relationship with nature in order to escape the pressures of civilized life. If the young generation is being influenced by primarily urban environments, then they will never develop a healthy interaction with natural areas, ignorance will prevail, and they will not recognize the need to protect these environments.



P09



P10

09theory

The strategy to balance our land ethic can be achieved with awareness and observation. This project will look at the design process from the human perspective in two dimensions, internal values and external observations, facilitating the human dwelling as a reaction to the site, not an intruder. I will design with an approach that outwardly observes the active condition of the site, and then design the dwellings to fit into (or enhance) the existing system. The dwelling inhabits the site; the human inhabits the dwelling. The current state of being removed from the understanding of natural processes puts us in an uneducated and potentially dangerous position as a manipulator of the land. Observation is the way to study and learn from our environment, it allows us to gain humility as we realize that everything in nature we can learn something from.

In order to design an interactive space between people and their environment, I am proposing that each installation will be a space in which people can perform instinctual tasks like eat, sleep, and be sheltered. It will also facilitate human observation of the natural world without disturbing it, and allow for people to engage in internal contemplation and meditation away from the civilized world. Each installation will practice efficient design by using the overlap or multi-use of spaces to keep the building's square footage low, minimizing the footprint.

The following values and observations are tools that I will use to guide the final solution:

internal design values:

- _Facilitate the transitional human user as a symbiotic partner to the environment
- _Create solutions to solve problems at multiple interrelated scales
- _Choreograph adaptive design to accommodate dynamic natural systems and human activity
- _Produce an informative solution for outreach and example

external observations:

- _Active conditions of scalar ecosystems and their interdependency
- _Cultural and societal impacts on site
- _Human user lifestyle flexibility needs
- _The building lifecycle implications [consider the impact on environment at the end of lifecycle, and after]



11theory

The first internal design value is to facilitate the transitional human user as a symbiotic partner to the environment. This strategy encourages the idea of the recreational, interaction zone to be welcoming to many users, that the act of transitional dwelling does not negatively impact the surrounding ecosystem, and if needed could actually enhance the processes of that ecosystem through active healing or remediation of present human impact. The second internal design value is concerned with creating solutions that attempt to solve problems at many different scales. This allows for a vacillation of efforts and realization of far-reaching impact outside of the locality of the immediate site. For example, my thesis will provide a solution for the Gallatin Valley, but can it also affect Montana, or the US, or the World on different scales? The third, choreograph adaptive design to accommodate dynamic natural systems and human activity, encourages the design of the dwelling or structure to inhabit the environment with the intent and ability to change with it, and then welcome and accommodate the variety of human users and their activities with adaptive measures. The human lifestyle is active and fluctuating, as are the systems of the natural environment; therefore, the building should strive to be flexible and adaptable to accommodate. The last internal design value is one of educational outreach: produce an informative solution for outreach and example. The built product should reveal its means and methods to encourage and teach these design values to those who experience it, whether it be learning resourcefulness from a working water catchment system, or gaining knowledge about an ecosystem because the built space can frame it in a way that facilitates learning.

The following proposed external observation guidelines should be considered in conjunction with the internal values to ensure a project of true sustainability in its entirety. The first external observation site strategy is to recognize that the ecosystems have many interdependent scales. The food chain is a good example in that the smallest species may seem insignificant, but yet as it affects each species above it on the food chain, eventually it's impact is felt by the largest species. As a human observer, attention should be paid to documenting any human made impact and the effect (i.e. dams, human erosion, pollution). Every site has a story that dates further back than the present. The second observation strategy considers that the story of the site may have implications. What are the cultural and societal stigmas on the site, and how would the addition of the building fit in? The third consideration encourages designers to regard the building as having a life-cycle. It is inevitable that the building will cycle through different states, whether it be from new governing bodies who disagree with its necessity, or if it outlives the life of its own materials and decomposes into the ground. What are the impacts when this happens? Is there a way to design for that moment and choreograph its disposal? When it goes, will it leave a deficiency in the ecosystem that had become dependant on it? Lastly, I will be an aware observer of the human user lifestyle, and its need for flexibility. In proposing a positive alternative to the oversized vacation home, this installation must be host to a variety of people, with a variety of activities, such as eating, sleeping, observing. The shelter will embody those tasks with a sense of scale and efficiency of space.

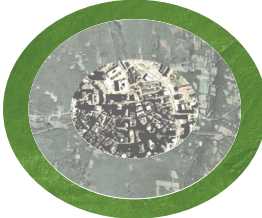
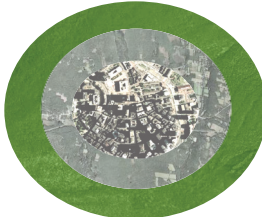
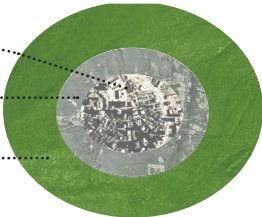


P11

urban core.....

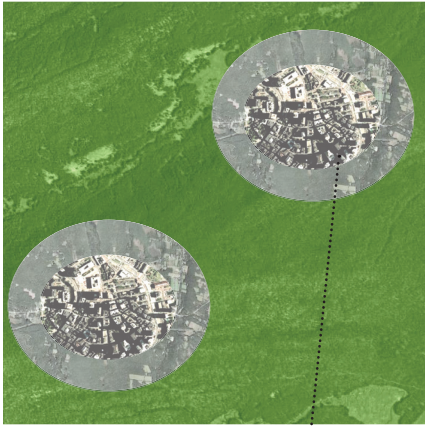
diluted natural grain.....

wilderness areas.....

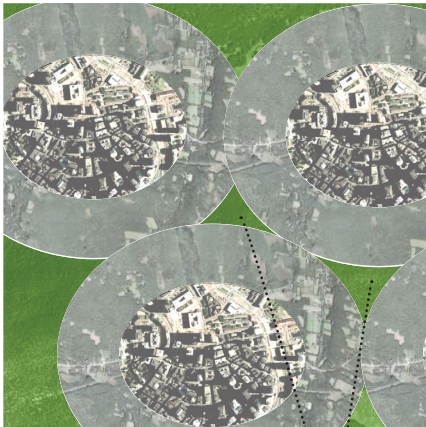


13theory

If we analyze and record the amount of land impacted by human pressure on a gradient scale, the two opposite extremes fall at no human contact and irreversible human contact. Sandwiched between the two extremes are zones such as suburban sprawl, desolate highway stretches, burgeoning rural towns, landfill sites, mining operations, campgrounds, and national parks and forests. These intermediate zones have become so interspersed with modern civilization that it is not uncommon to see one opposite enveloped by the other. Unrestricted human development of land sprawls outward from a centralized point of dense urban grain and becomes diluted as it gains distance. Human habitation eventually fills in this zone of diluted grain due to the natural diffusion of population into adjacent open space, thus exuding human influence further into the natural areas. These radiating cores have sprawled so far that they have backed up into each other. What could once be diagrammed as a concentrated urban core in a field of natural area is now inverted:



radiating urban cores in a field of natural area



isolated pockets of designated wilderness

• “The boundaries of many older cities now
• overlap at their edges, forming vast urban
• fields with multiple centers, rather than a single
• core. Remaining patches of countryside are
• now commonly bounded by the outer suburbs
• of several cities. Indeed, huge urban constella-
• tions, each composed of many cities, surround
• most of the remaining wilderness areas of the
• United States. Real solutions to the problems of
• both city and suburb can now be achieved only
• through understanding the place of each within
• the larger region and by viewing city, suburbs,
• and countryside as a single, evolving system
• linked by the processes of nature and the social
• and economic concerns of humans.”
• – Anne Whiston Spirn⁰⁸



P12

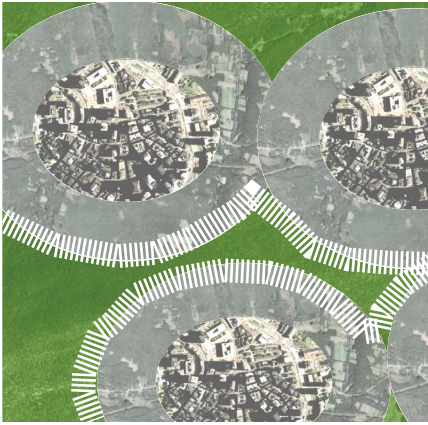
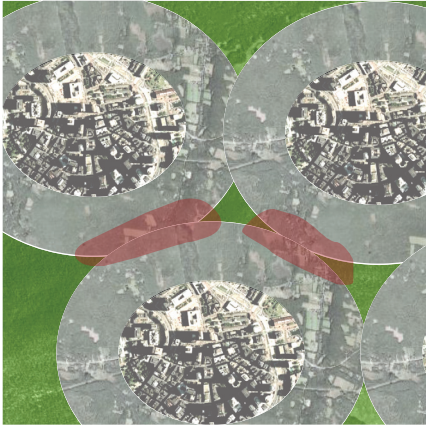
15theory

In following Spirn’s prescription, in order to co-exist we have to consider ourselves as one system with nature. However, for both entities of the system to survive, we must regulate exposure by reinforcing a symbiotic buffer zone where humans can interact with nature on a scale that has positive impact for both. These buffer zones exist already within the world’s system, they are the border at the edge of civilization, the blurred middle on the gradient described above. Historically this ambiguous line of equilibrium describing the edge of two worlds was a very charged place. David Abram’s studies of traditional cultures, “The Ecology of Magic,” discussed the history that “the edge, the ‘both/and,’ the spatial periphery of communities in the ancestral cultures,” were once the realm for the healer, shaman, or sorcerer of the community. The community believed that the healer’s occupancy of this compromising space put them into spiritual negotiations with the natural world.⁰⁹ They lived with the belief that the wilderness beyond was responsible for the health, healing, and nourishment of the community it was adjacent to. This periphery was a space of respect and charged interaction with nature:

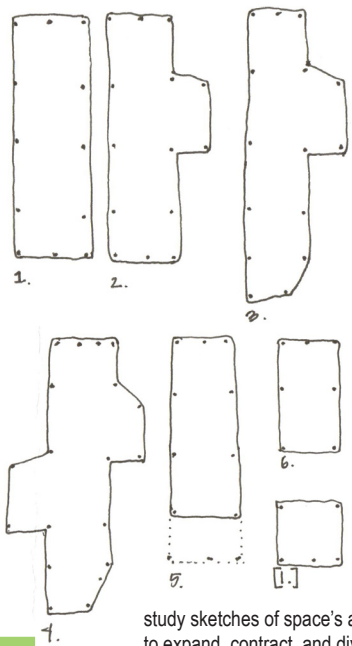
“Noting that the very structures and technologies of our civilized existence have promoted our obliviousness to nonhuman nature, Abram asks if we can ever hope to again understand (and to restructure) this relationship. We certainly cannot, he asserts, if we approach the problem ‘from within the midst of the very civilization it engendered. But perhaps we may make our stand along the edge of that civilization, like a magician.’ Perhaps to heal the [urban environment] we should reengage that which it is not.” – Clark Stevens ¹⁰

Reinforcing the natural characteristics of the periphery zone will not only allow for a healthy coexistence with the human race, it will also further protect the remaining natural areas from contamination through their borders. As a solution for the macro scale, the isolated natural pockets could be connected where possible to provide forest corridors throughout the landscape. This further reinforces the individual areas by lessening the amount of their boundaries in contact with civilization, thus lessening the amount of negative human impact diffusion through its borders.

This thesis will develop a reinforcement solution in a local buffer zone, with the ultimate implication that these areas of weak links through the civilized periphery can be found elsewhere in the world. These other charged sites can be reinforced in the same manner and with legislation and conservation techniques can bring together other pockets of wild lands.



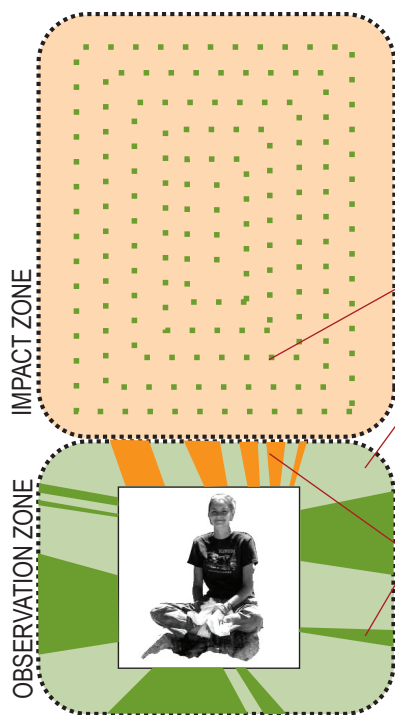
The diagram on the left shows how we can analyze zones in the world where civilizations back into each other. There will be areas where natural characteristics can be replenished, thus pushing back the edge of civilization and allowing for pockets of natural grain to connect and form corridors of unbroken nature as in the diagram on the right.



study sketches of space's ability to expand, contract, and divide to accommodate change

program/code

This thesis proposes the introduction of several architectural installations that inhabit the periphery of the wilderness study area to reinforce and protect the wilderness characteristics. The installations will be a space where humans can interact with nature in a way that provides the person with separation and solace from everyday life, a heightened appreciation of natural areas, and a renewed sense of obligation to protect or encourage growth of the few remaining wild areas. The installations will provide for the natural environment a remediation program that will help reverse the existing instances of negative human impact by remediating motorized vehicle erosion, controlling thresholds, and nurturing wildlife habitat areas. The installations will inhabit areas of the natural grain who's ecosystems have been significantly interrupted by human impact. Each human housing installation will be a built form that enforces a limited square footage and footprint. The installations will be a range of sizes, between 50-200 square feet based on the natural parameters of the site. Each building will have the capacity to expand and contract to increase or decrease the square footage for transient habitation. Each installation site will consist of an architectural enclosure, and an adjacent zone where remediation of human interruption of the ecosystem will take place.



_This diagram demonstrates the site strategy of finding adjacencies in the natural environment of visible human impact and seemingly untouched natural areas.

The impact zone becomes the remediation zone.

The observation zone is the dwelling installation site for human activity and observation of the natural environment, solace, inner contemplation or meditation

The installation will frame views of the natural environment and also of the contrasting impact zone in order to illustrate the affect of human abuse on the landscape.

The remediation techniques will vary due to the type of human impact on the site, but would include soil study and regeneration, regrading of disturbed landscape, reseeded of destroyed vegetation, control of invasive species, and ground water filtering if pollutants are present. The remediation plots will also serve as a visual constitution to the effects of human impact, and the means necessary to reverse them.

These installations would have three major users: transitional human recreators, Forest Service study teams, and the living things in the ecosystem that it inhabits. The minimal shelters will grow from the consideration of the aforementioned internal design values and the external observations. Each installation will provide a low-impact, flexible, temporary dwelling for recreational use to encourage an alternative to the vacation home.



19program

The primary human activities that the installation will accommodate are cooking, eating, sleeping, washing, observing the environment, and inner contemplation. Through the innovation of systems, the structure will promote the practice of adaptable, symbiotic design and offer the possibility of enhancing its surrounding environment. Implementation of the shelters will reinforce the natural grain by creating a controlled environment outside of the designated wilderness where humans can interact with nature in a way that alleviates the human impact from the surroundings, and also allows for humans to reach solace in nature. The building will do this through many integrated systems, including passive solar gain and shading devices, passive ventilation, water harvesting, composting toilets.

The lifecycle of the architectural installations will be choreographed, and the built structures can be packed up and transported to a new location for many reasons: if the remediation process is effectively finished and another site is in need of the services, if the ecosystem is becoming dependent on the installation and changing its self-sufficient status, if the wilderness designation requires removal of structures, or if the materials or connections are reaching their lifecycle end, and need to be recycled to be effective again.

To further respect the effects of human impact, all the equipment and materials needed for construction will be hiked-in, packed-in on stock animals, or delivered by helicopter (if necessary). This will ensure that the construction process itself will not inflict excess harm on the surrounding environment. The built structures themselves will have limited access due to the nature of the concept. They will not have motorized vehicle access, but can

be reached by hiking, biking, horseback riding, and other muscle powered means of transportation.
Because of the limited access, installation status, and location in the national forest, code requirements might vary from other R-1 occupancies:

301.1 Residential Group R-1: Residential occupancies containing sleeping units where the occupants are primarily transient in nature, including: Boarding houses (transient), Hotels (transient), Motels (transient)

602.5 Type V. Type V construction is that type of construction in which the structural elements, exterior walls and interior walls are of any materials permitted by this code.

1005.1 Minimum width of Egress (without sprinkler)- stairway: 0.3” per occupant, other egress: 0.2” per occupant.

1014.3 Common path of egress travel. In occupancies other than Groups H-1, H-2 and H-3, the common path of egress travel shall not exceed 75 feet (22860mm).

2902.1 Minimum number of plumbing facilities for R-1: 1 water closet per sleeping unit, 1 lav per sleeping unit, 1 bathtub/shower per sleeping unit, 1 service sink.

All references above from 2006 International Building Code.¹¹



Nature's Head composting toilet, P13



Yellowstone National Park, P14

21site

site analysis

Many people appreciate and utilize the natural areas for outdoor recreation; however, because there is an abundance of land, there also exist groups of people that take it for granted, and treat it as an entitlement instead of a gift. To combat this attitude, across the United States there are zones of protected federal land with many different designations, the western US housing the majority. In the Greater Yellowstone Area there are examples of 3 major designations: National Forest, National Wilderness, and National Park. The Gallatin National Forest is 1.8 million acres of nationally protected land in the Gallatin Valley region of Montana. Established in 1899, it boasts 6 mountain ranges, 2 wilderness areas, and 4 federally listed threatened species (grizzly bear, gray wolf, bald eagle, and Canada lynx) living within its borders. The Gallatin is part of the Greater Yellowstone Area, the largest intact ecosystem in the continental United States. It abuts Yellowstone National Park and they each create a buffer protecting each other from the diffusion of heavy human impact; in essence they reinforce each other's periphery. The Lee Metcalf and Absaroka Beartooth Wilderness areas are the two islands of designated wilderness in the GNF.¹²

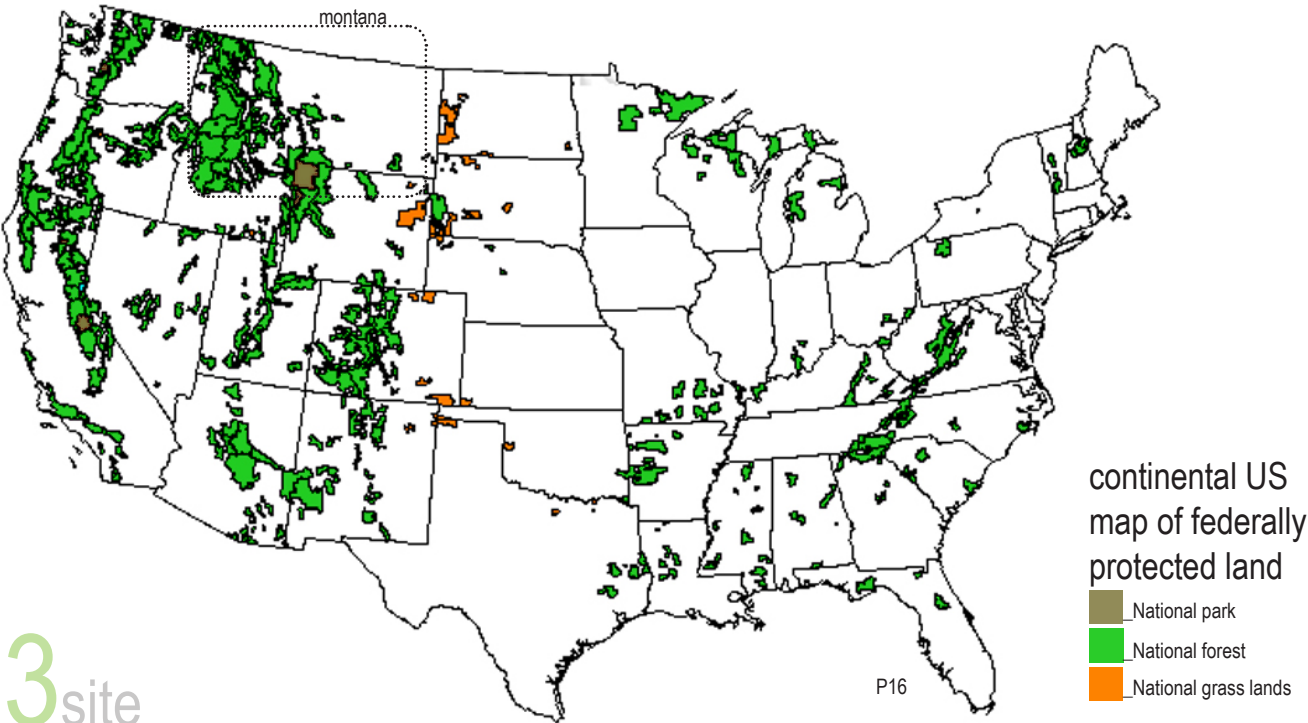
Wilderness areas differ from National Forest areas in their regulated allowance of human interaction, allowing only low impact recreation such as hiking, fishing, horseback

riding and backpacking. National Forest areas, although regulated, often allow in addition to the above low impact recreation, vehicular traffic and regular road maintenance, logging, and hunting. Wilderness areas are designated and protected by Congress under the regulations of the National Wilderness Preservation System. This was established under the Wilderness Act of 1964, signed by Lyndon B. Johnson. If their natural processes have not been significantly altered by human interaction outside of their primitive state, they are designated wilderness in order to protect that status. The Wilderness Act defines the wilderness designation as such:

A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value. – Wilderness Act of 1964¹³

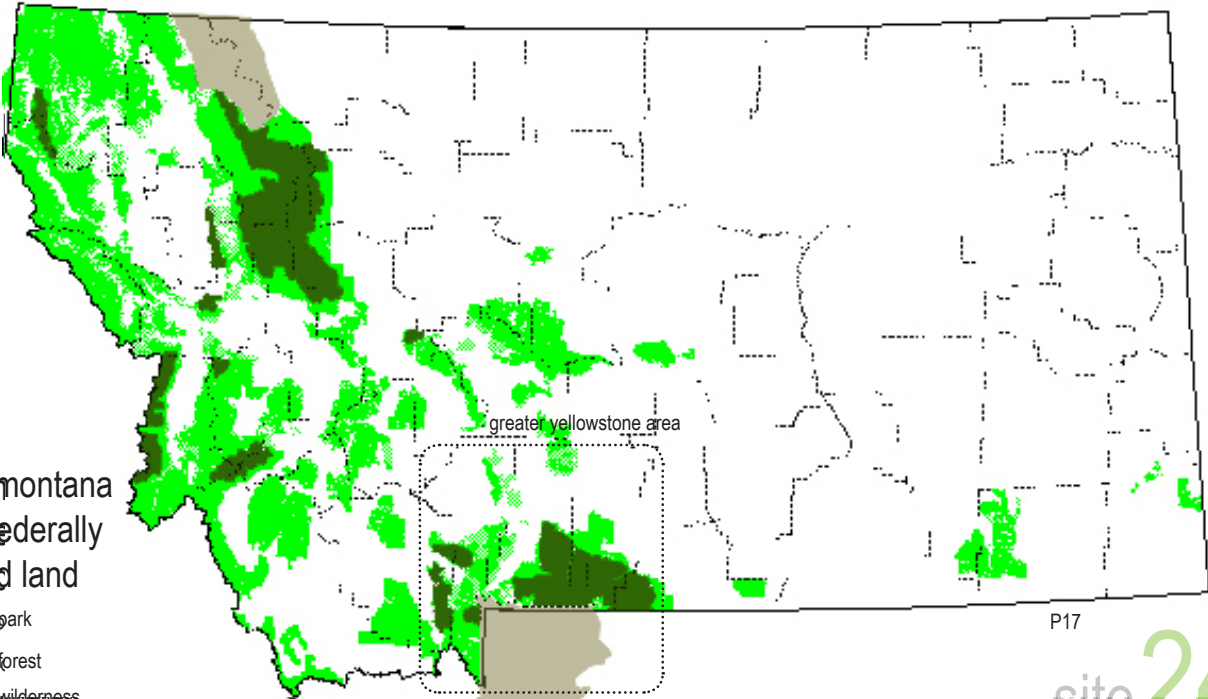


Absaroka Beartooth Wilderness, P15



**state of montana
map of federally
protected land**

-  National park
-  National forest
-  National wilderness

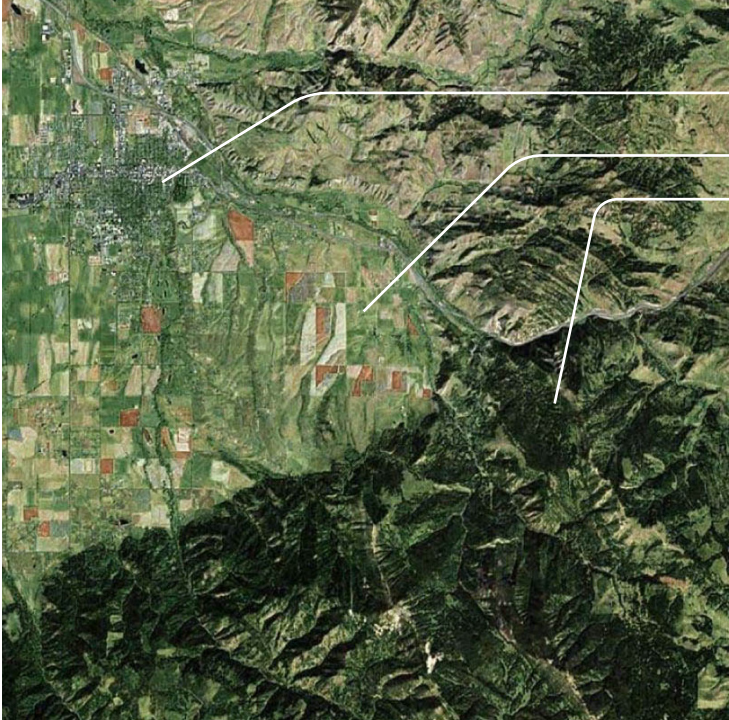


P17

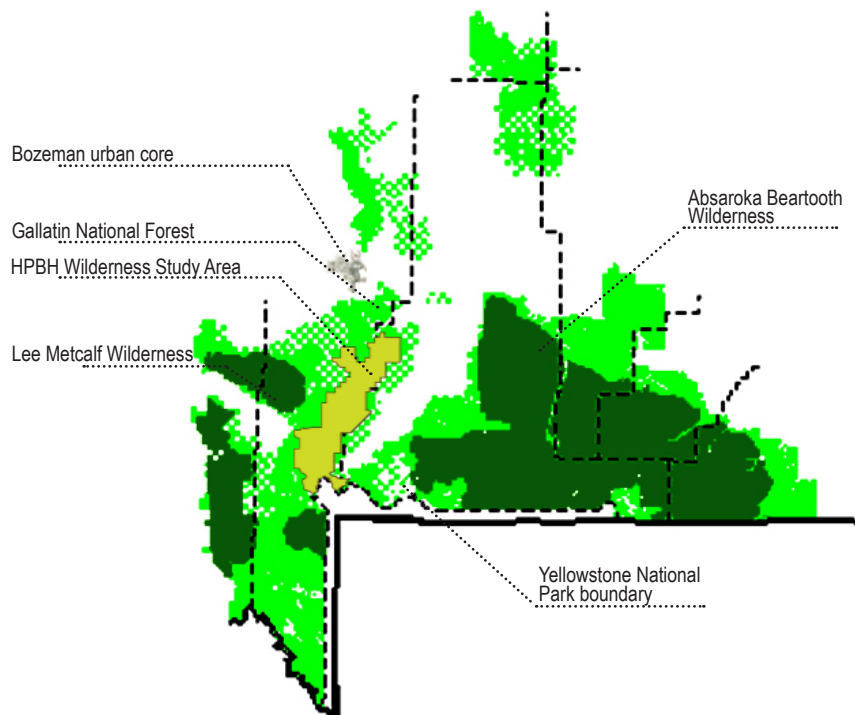
The Bureau of Land Management labels a piece of land with potential wilderness characteristics as Wilderness Study Area under the National Landscape Conservation System. It will exist in transition between a Forest and Wilderness designation, locally protected and studied until it can produce evidence of the characteristics Congress requires to make an official Wilderness designation.¹³

The local WSA is 155,000 acres in the GNF called Hyalite Porcupine Buffalo Horn Wilderness Study Area (HPBH WSA). Its location and societal history makes it the perfect embodiment of the periphery zone under attack. The HPBH WSA has been labeled such since 1977, and shows no signs of fully transitioning. In December of 2006 the Gallatin National Forest Service submitted their latest land use plan for

25site



Bozeman urban core
diluted natural grain
natural grain



the forest. Some residents complained that the forest service was unfairly limiting the use of motorized vehicles, while other residents denounced the increased allowance of motorized vehicles into the natural environment. The latter criticism came directly as a reaction to the forest service's plan to allow an increase of the use of motorized vehicles in the specific region of the HPBH Wilderness Study Area. Because this was a blatant violation of the National Landscape Conservation System's requirements to keep the study area at the same land use restrictions as the conditions in 1977 were, Magistrate Judge Jeremiah C. Lynch ruled against the plan, specifically in the HPBH WSA.¹⁴



Hyalite lake is one of the many beautiful landscapes and diverse ecosystems protected within the Hyalite Porcupine Buffalo Horn Wilderness Study Area, P19.

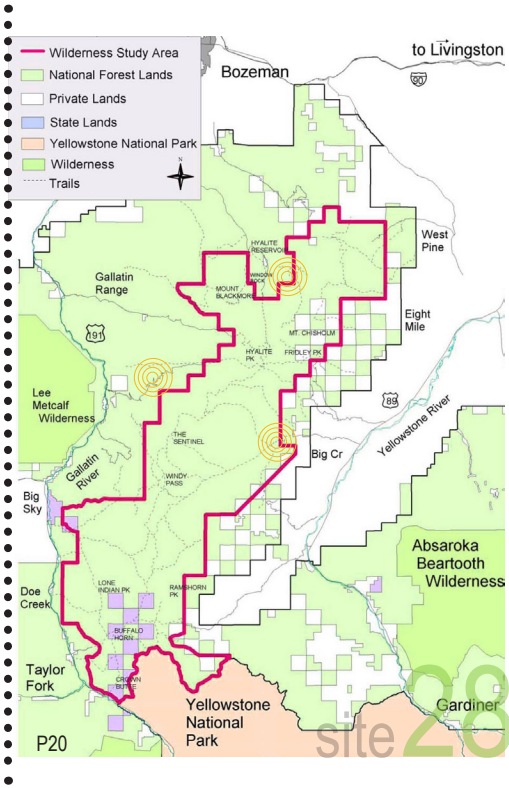
The controversy lies in the private interest groups: the human users. This area, caught in a political, ethical, and societal tug of war is the ideal site for my thesis. It will be dubbed as the periphery, the diffuse edge between civilization and wilderness, and the charged zone of influence. It will take that which is the buffer between forest and wilderness and reinforce its borders, study its interiors, and regulate human interaction, with the final goal of becoming wilderness designation. This goal will radiate its solution on a larger scale as this area will bridge the gap between the existing National Wilderness areas, solidifying the wild land corridor from Yellowstone National Park to Bozeman and joining the isolated pockets of Wilderness into a contiguous wildlife habitat. I have analyzed the target areas by reviewing the HPBH Wilderness Character Assessment, compiled by the forest service in 2003, and the Gallatin National Forest Final Environmental Impact Statement of 2006.

The character assessment is a report of the findings regarding the eligibility of the study area to become designated wilderness. The findings reported many areas where human impact has caused noticeable damage to wilderness characteristics. The study area was analyzed for 4 characteristics: Natural Integrity, Apparent Naturalness (visible human impact), Remoteness, and Opportunity for Solitude. Major impediments to the designation of wilderness are from specific human impact sites: logging roads, clear cut logging damage on private land that now are included in the Study Area, trail damage due to motorized vehicles, and evidence of a decrease in wildlife habitats (due to the above human impact).

“Most of the area is suitable for wilderness consideration. Impacts to the area’s natural integrity and appearance tend to be on the area’s periphery. Natural appearance of the area will be affected in a few places by sight or sounds from outside the boundaries, but these disturbances would probably affect less than 5 percent of the area.”¹⁵ The assessment reveals that the areas around the study area borders are the most affected by negative human impact which is why I focused on that area when choosing the sites for my thesis implementation.

The number one reason why the Forest Service did not recommend the WSA suitable for wilderness designation was based on the checkerboard of private land ownership within the boundary. The majority of these in holdings were owned by Burlington Northern Railroad and its timber subsidiary Plum Creek Timber, Inc. In 1977 when the HPBH WSA was formed, the private ownership was 31.8%. In year 2003 through numerous land exchanges, the number fell to 7.6%. Due to the amount of private land the forest service has acquired within the WSA boundaries since the first recommendation, they now have recommended to Congress that the area be designated wilderness, however the private interest of keeping the area open to motorized vehicles seems to be the largest political impediment as of now.¹⁶

Controversy surrounds the legislature governing the wilderness designation. There has been no wilderness designation legislature passed in the state of Montana since 1982. I intend to create a solution of protection for this natural land that will keep it safe until





This photo shows the destruction of sediment left by a motorcycle long after the machine is gone. photo by Phil Knight

29site

a Wilderness bill gets passed, or in the case that it never does. My thesis will evaluate specific locations of this degradation due to human traffic and asses the proper site(s) for remediation. Although much of the forest bears scars of many different types of human manipulation, the most visible damage is caused by motorized vehicular use on the trails.¹⁷ I find this most important because motorized vehicles impact the environment on many different levels. Many of the access points into the Wilderness Study Area are trails along creeks, because people value rivers and creeks as natural scenery experiences. These trails often lead to high mountain lakes and the streams are usually flowing from the lake into the valley watershed. Motorized vehicles inflict stress by destroying trailside vegetation thus widening the trail, and often leaving destructive ruts in the soft soil banks. Over time, the creek banks are de-stabilized and the riparian ecosystems compromised by erosion. Motorized vehicles also threaten wilderness characteristics by way of noise pollution; not only disrupting wildlife that come to these creeks to drink, but other trail users such as hikers who come into natural areas for silence. My thesis would work with the implication that these trails would be changed in the travel plan to restrict motorized vehicles in order to allow for the rehabilitation of habitat and land, keep characteristics natural for wilderness designation, and to control the zone where people can experience nature in a no-impact situation. The implication of focusing on three sites in my thesis is that future sites would be implemented as needed to secure the boundary. I looked for specific common characteristics when narrowing down to three sites. I found through reading the character assessment that areas with the most ecosystem damage are

popular, high traffic areas due to their ease of access. I looked first at these kind of access points and also, the areas open to motorized traffic, trails that run along creeks and delicate riparian ecosystems; I wanted to represent access from the North, West, and East boundaries of the WSA respectively (the South is protected by Yellowstone National Park). I want to provide solutions for these three sites: East Fork of Hyalite Creek Trail-head, Swan Creek Trail and Big Creek Trail towards Windy Pass.

In choosing the specific sites for the human interaction installations I started with documenting the visible destruction to the natural landscape that I observed while hiking. I explored the areas on the periphery of the destruction to find a visibly untouched site for the human interaction space. I believe it is important to house the installation in proximity to the destruction site, but not directly on top for three reasons: to show the contrast between human destruction and visibly untouched natural areas, to allow for observation and implementation of rehabilitation of the scarred area, and to detour passage away from the area to encourage natural rehabilitation. I have labeled these contrasting zones in the site diagrams as “observation zone” and the “impact zone.” I also found the most sites to be on the threshold or right outside of the boundaries of the WSA as a way to control access, and highlight the fact that these are man-made boundaries and ecosystems will live regardless of them. I want to reinforce the borders, and placing these interactions at the threshold allows for the natural area to grow outward from the border, instead of just reinforcing the area that has already been designated.



Swan Creek Trail, motorized vehicle erosion of bank, breaching creek results in loss of habitat at site and further down. photo by Phil Knight



natural scenery East Fork Hyalite Creek

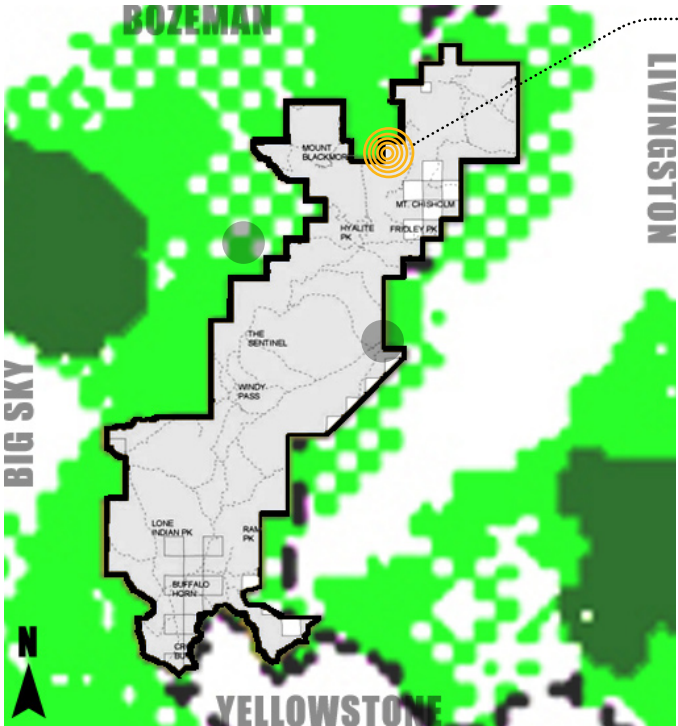


An Emerald Lake user created trail (illegal). Where erosion inevitably becomes impassable, users braid new trails around spreading the destruction. - photo by Phil Knight

31site

East Fork of Hyalite Creek Trailhead:

This site is the access point closest to the Bozeman center and sees a lot of traffic due to the proximity to Bozeman, and the popularity of the beautiful Hyalite Canyon area trails. East Fork of Hyalite (#434) is the trail to Emerald and Heather Lakes and can be reached by driving a mile past the Palisade Falls trailhead after circling the reservoir.¹⁸ Motorized vehicles less than 40" are allowed on the trail, as well as stock trips (horses), hikers, and mountain bikers. The trail closely follows the East Fork of Hyalite Creek and trail users can experience two major waterfalls from the trail, as well as the two mountain lakes at the summit, Emerald and Heather Lakes.¹⁹ I chose this site to address the importance of entrance, access, and threshold. The trailhead parking lot is heavily eroded due to car travel, and user created motorized trails. Users have ignored the sanctity of this site as an access point to the natural environment, disregarding the continuity that ecosystems have through boundaries. The destruction of the parking area continues past the threshold of the trailhead as motorcycles have blazed their own paths into the depth of the natural area. There is a picnic site at the trailhead that sits right on the creek. I would like to explore this area as the site for an installation. This area exists as a natural area adjacent to a visibly scarred landscape. People can interact with nature but also be aware of the effects of negative human impact. The installation will address remediation of the trailhead threshold, and offer focus and observation of the adjacent riparian ecosystem that is being affected by the traffic at its borders.



East Fork of Hyalite Creek Site Characteristics:

- _The creek flows North from the alpine lake Emerald; it is a tributary of Hyalite Creek.
- _Fish species in the creek are Brook Trout, Mottled Sculpin, Arctic Grayling and Yellowstone cutthroat trout. Game fishing of these species is regulated.²⁰
- _The trail leads 5 miles up to Emerald Lake with an elevation gain of 2,000 feet. A popular place because of its staggering scale, the alpine lakes sit in a cirque of 10,000 foot mountains, Mount Chisolm and Overlook Mountain.²¹
- _Open to motorcycles and cars, many illegal user created trails have ripped through the natural vegetation.
- _This Northern boundary site represents the heaviest recreation use of the three sites, due to the proximity to Bozeman.

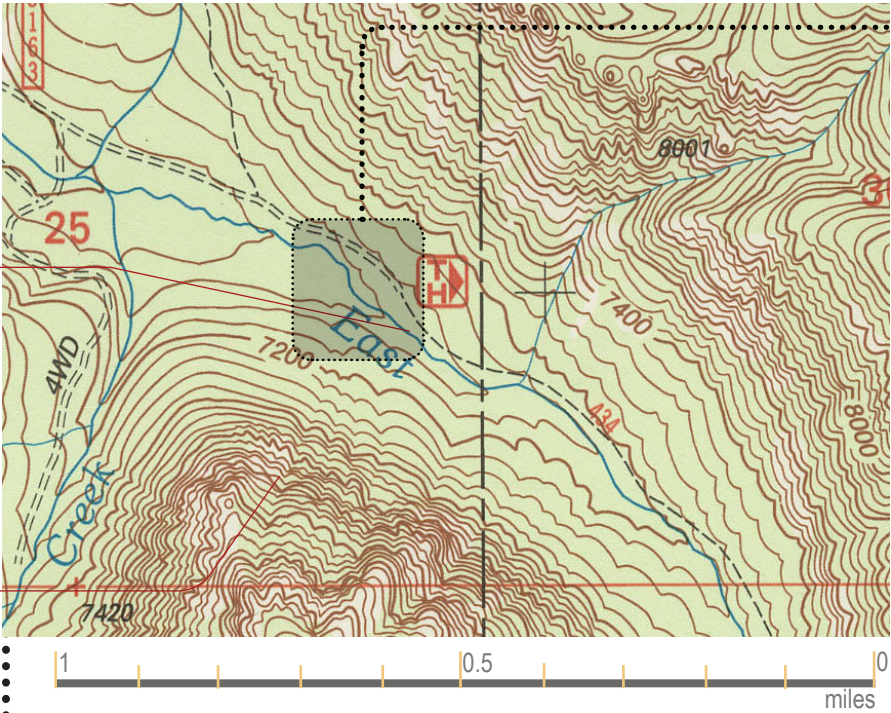


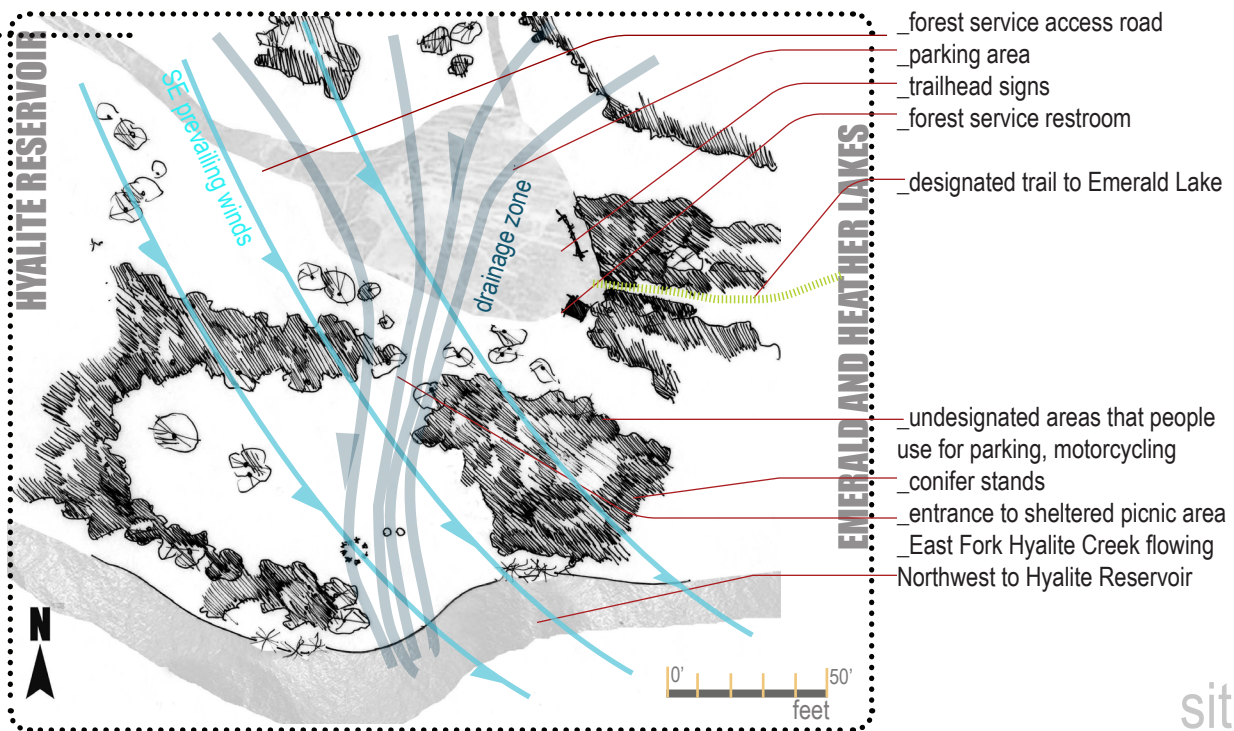
East Fork Hyalite Creek



Rock ridge in front of Sleeping Giant

33site



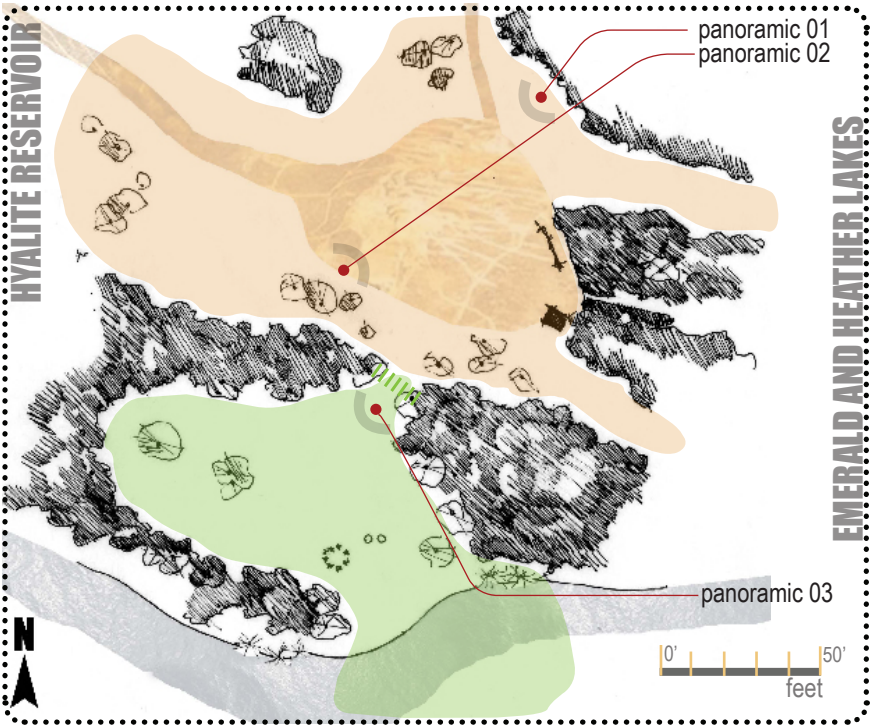


Adjacencies

In observing the sites, I looked for adjacency zones where natural areas were located next to the areas of human impact, but yet separated in terms of their visable impact. This is often because natural barriers and or spatial organizations that naturally delineate spaces (i.e. a clearing in a forest) can discourage motorized vehicle trespass.

The observation zone is a slightly sunken clearing by the creek that is currently being used as a picnic spot. The trees create a natural buffer around the area and the grade change implies a threshold that discourages motorized passage. The adjacent impact zone is the parking lot area. Cars and other motorized vehicles have disrupted the natural vegetation in and around the parking area to a point where the soil does not accommodate new growth.

35site



observation zone



impact zone



natural preventing threshold



Latitude - 45° 27' North
Longitude - 110° 55' West ²²
Elevation- 7100' ²³

Average Annual Precipitation: 22-26"
Prevailing Wind Direction: SSE
Potential Conifer Species: Douglas Fir, Engelmann Spruce, Subalpine Fir, Lodgepole Pine, Whitebark Pine.²⁴

Sun Angles:
December 21, 12:20pm - Altitude: 21.6° Azimuth: 175.5° E of N
June 21, 12:20pm - Altitude: 68.4° Azimuth: 178.8° E of N ²⁵



panoramic 01



panoramic 02

37 site





panoramic 03



This Google Earth Aerial View shows the extension of the impact site into the surrounding forest



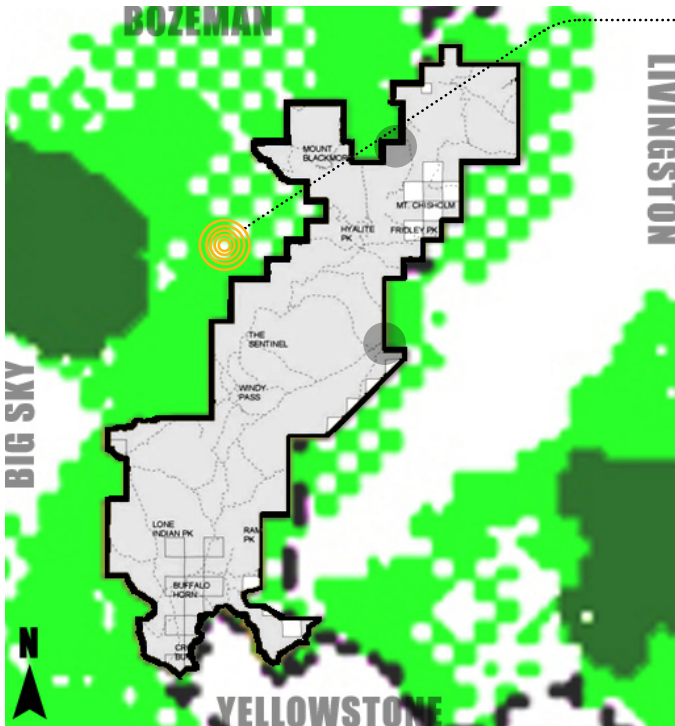
natural scenery Swan Creek



ATV damage Swan Creek Trail. - photo by Phil Knight

Swan Creek Trail:

The Swan Creek Trail (#186) is another access point to the Hyalite Porcupine Buffalo Horn Wilderness Study Area along its Western border. It is a significant part of the periphery as it is in Gallatin Canyon, and settled only one mile off the highway, right past the Swan Creek Campground. Many people travel highway 191 from Bozeman to Big Sky, Yellowstone Club, or West Yellowstone, and the campground is a popular place during peak season because of its ease to get to and it's creek-side appeal.²⁶ Campgrounds are especially high impact places because they allow for a concentration of people to stay at a place for a long amount of time. The majority of campgrounds are positioned near a water source for scenic opportunities as well as to use for cooking meals. Motorized access is easily facilitated from the campground also. This trail is an excellent example of the problems associated with mixed-use.²⁷ The trail cuts along the creek 11 miles into the study area, ending at Hyalite Peak; however the trail is fraught with intersections of old logging roads and the Big Sky Snowmobile trail. There are many instances along the scenic, quiet trail where it widens at the intersections and ATV use leaves impassible gauges in the soft soil. I came upon some heavy damage right after the intersection on the left with the trail that goes to Land of the Pines Lake. This trail is supposed to be designated only for snowmobiles, but lack of enforcement has left this trail ripped up and exposed.



Swan Creek Trail Site Characteristics:

- _The headwaters of Swan Creek starts at 9,400 ft on the West slope of Hyalite Peak. It is a tributary of the Gallatin River.
- _Fish species in the creek are Rainbow, Brown, Brook and Cutthroat trout and Whitefish.²⁸
- _The trail leads 11 miles up to Hyalite Peak where it intersects with the Gallatin Divide trail and Hyalite Creek trail.²⁹
- _This trail is most vulnerable at its intersections with wider trails. Many single track trails, although they may be open to motorized traffic, discourage it due to their lack of maneuverability. In contrast, wider trails, regardless of their restrictions, encourage illegal motorized because of their wide girth.
- _This trail's proximity to the creek facilitates erosion of the bank, detrimental to creekside vegetation and bank habitat.

site40

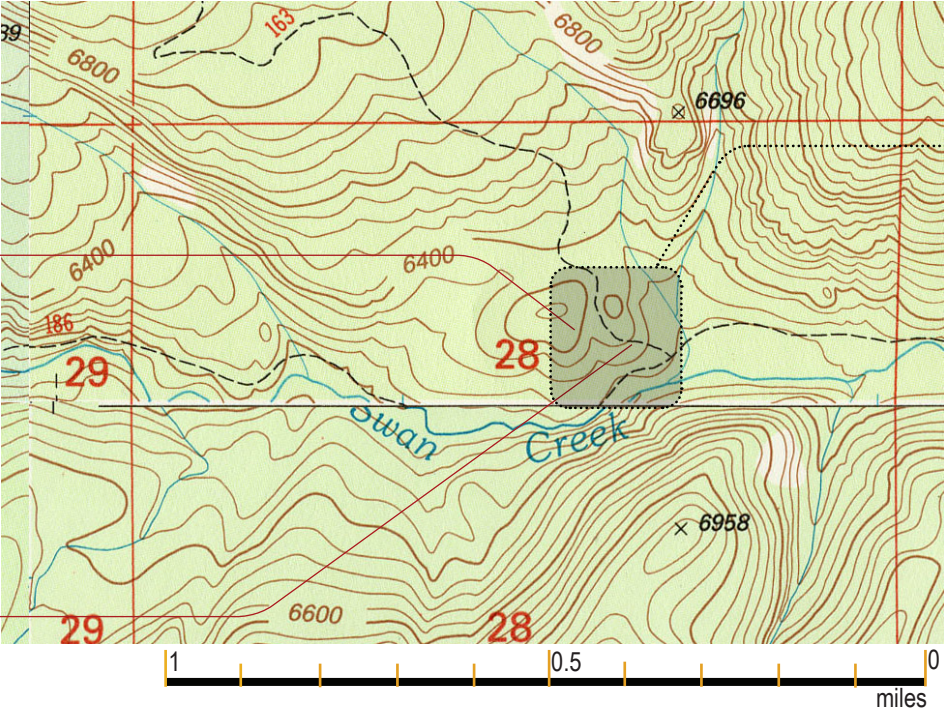


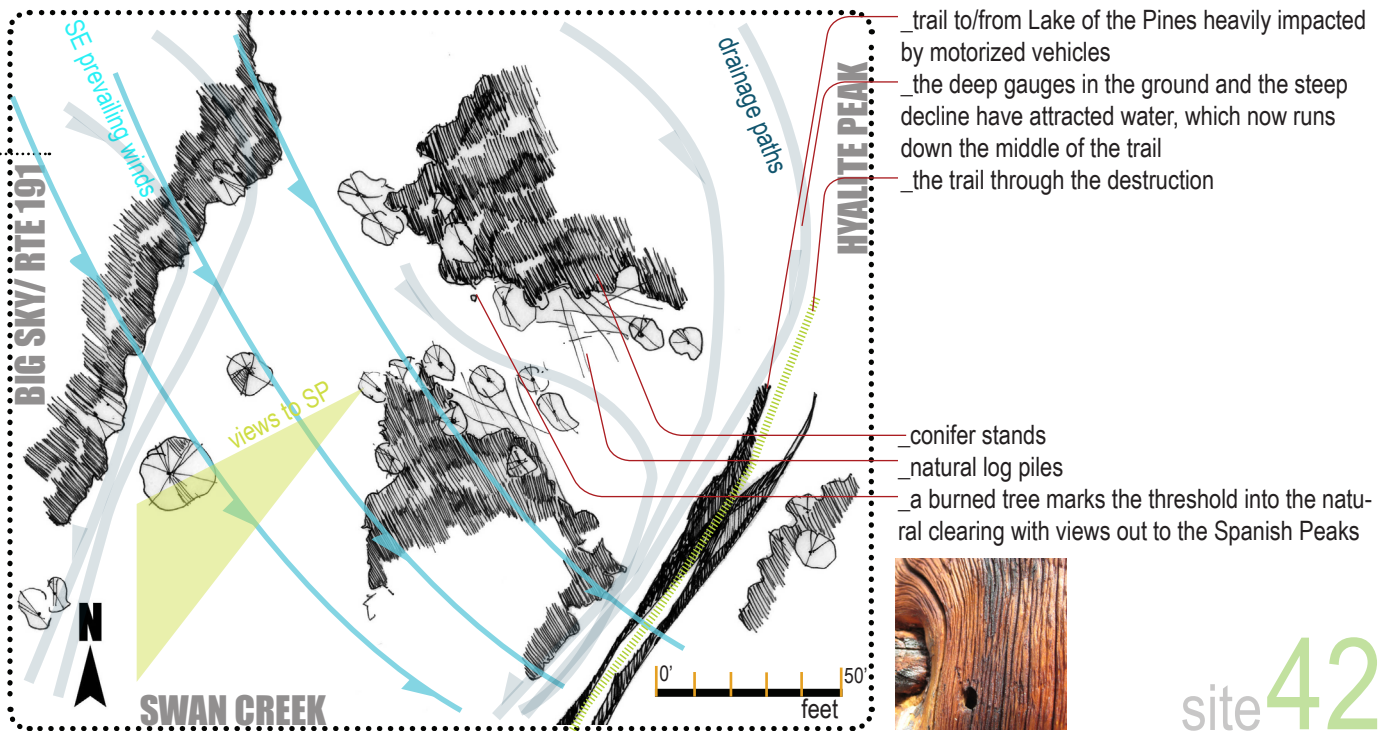
Adjacent natural clearing reveals views to the Spanish Peaks



Destructive ATV tracks have provoked drainage problems

41 site



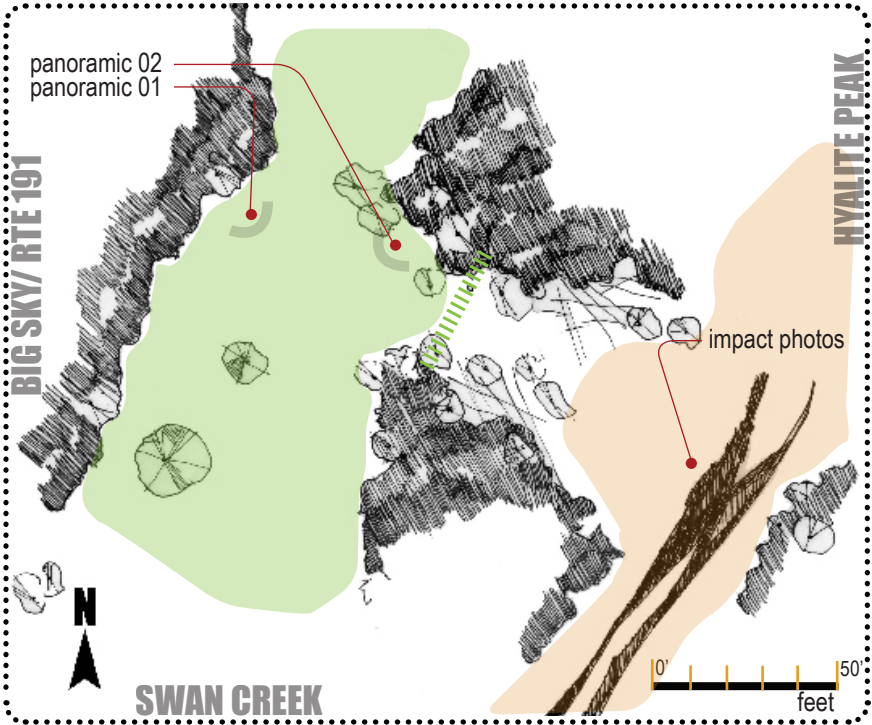


site42

Adjacencies

At the intersection between the Swan Creek trail and the Land of the Pines trail, I came upon deep tracks carved into the steep terrain from ATV overuse. I explored the area further and found a natural threshold into a dry opening West of the impact zone. This, I documented as the site for the observation zone. It is a breathtaking contrast from the destroyed saturated earth adjacent with its mature conifers and sweeping view of the Spanish Peaks.

43site



observation zone



impact zone



natural preventing threshold



Latitude - 45° 22' North
Longitude - 111° 7' West ³⁰
Elevation- 7100' ³¹

Average Annual Precipitation: 30-40”
Prevailing Wind Direction: SSE
Potential Conifer Species: Douglas Fir, Engelmann Spruce, Subalpine Fir,
Lodgepole Pine, Whitebark Pine. ³²

Sun Angles:
December 21, 12:20pm - Altitude: 21.6° Azimuth: 175.5° E of N
June 21, 12:20pm - Altitude: 68.4° Azimuth: 178.8° E of N ³³



impact photos

45site

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panoramic 01



panoramic 02

site46



natural vegetation Big Creek

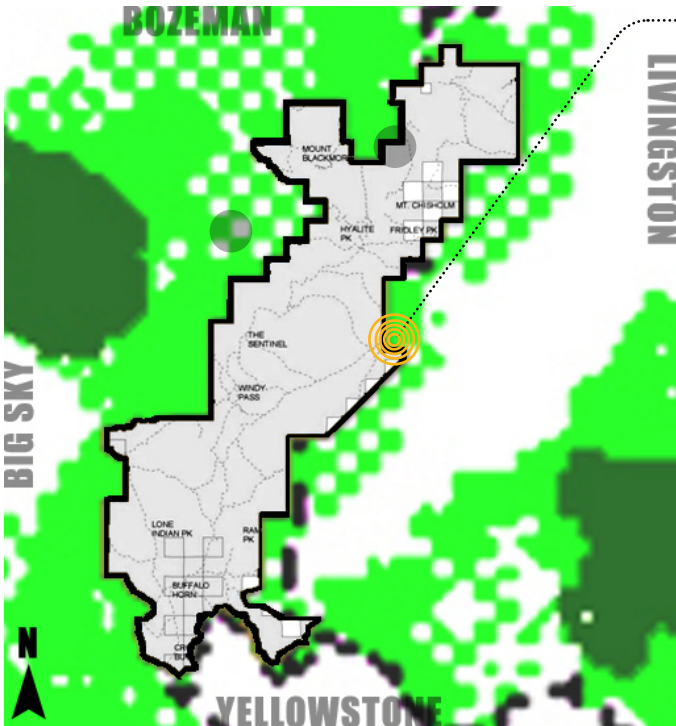


erosion and user created trails down to the creek bed

47 site

Big Creek Trail:

The Big Creek Trail is located off highway 89 about 30 miles South of Livingston. The access road into the trailhead passes Mountain Sky Guest Ranch, and a rental Forest Service Cabin.³⁴ The Big Creek area is managed by perscribed fires. “The burns, each approximately 300 acres in size, are designed to meet a multitude of ecological resource benefits including: reducing encroachment on aspen stands, grassland, and sagebrush meadows; maintaining areas with prescribed fire within their normal fire return interval; thus improving both public and firefighter safety in the event of an unwanted fire ignition.”³⁵ This site shows evidence of timber management, whether it be the towering brush piles, the stumps that litter the banks, the perscribed fires that leave an burnt tint to the hillside, or the old clearcut scars that still show on the surrounding mountains. Although the benefits of the management can be argued for, it still blaringly shows the influence of humans on nature. The trail follows the creek 12 miles up to Windy Pass, and the Gallatin Divide Trail. More than any of the other two sites this Eastern access point has far reaching impacts. The trail transverses the entire WSA and is a huge connector trail for many other trails that travel North and South into the heart of the roadless, natural environment. It also has a high occur-ance of Grizzly bear activity and sits above the Grizzly recovery zone. This site gains its importance through the ideas of access and habitat. The motorized travel here is prohibited, but there was visible evidence of user created trails cutting down to the creek banks from Cooper Bench.



Big Creek Trail Site Characteristics:

- _Big Creek begins on the East face of Gallatin Range, flows 18 miles to the Yellowstone River.
- _Fish species in the creek are Brown Trout, Mottled Sculpin, Mountain Whitefish, Rainbow Trout, Rainbow X Cutthroat Trout, Westslope Cutthroat Trout, Yellowstone Cutthroat Trout X Rainbow, Brook Trout .³⁶
- _The trail leads 12 miles into Windy Pass; it is a connector trail for a lot of the trails in the WSA.
- _This trail travels through Grizzly Bear habitat and abuse of the trails in that area can lead to a decrease in population.

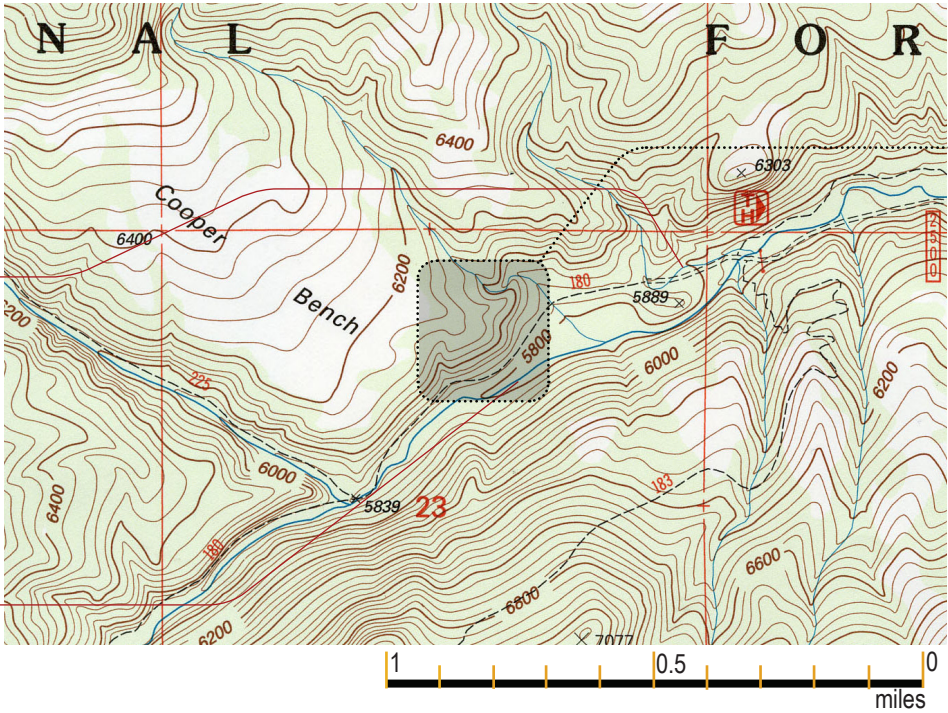


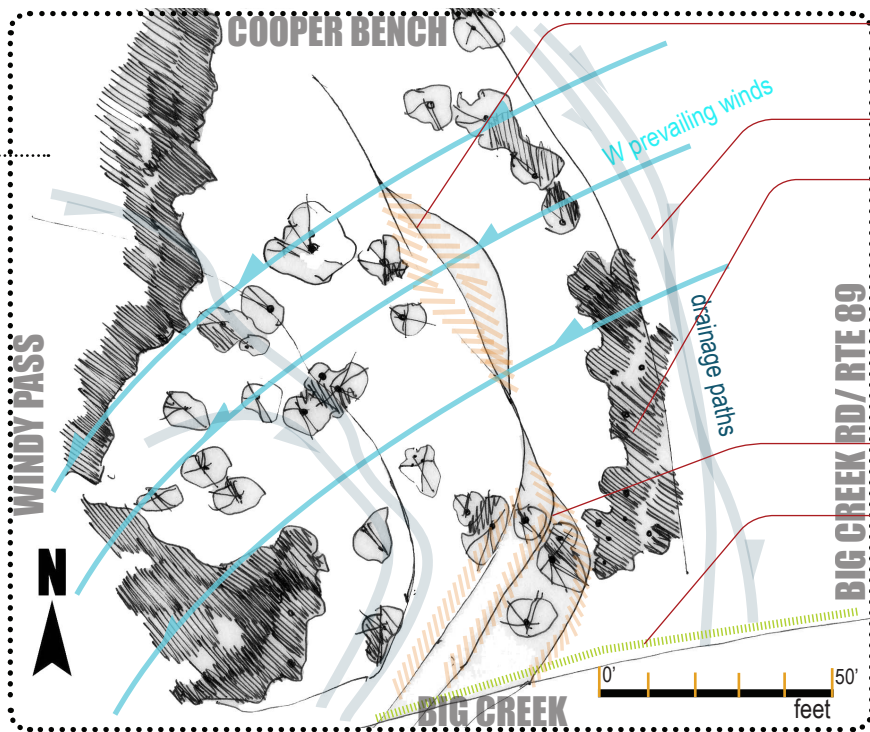
Brush piles line the road to the trailhead indicative of human management.



The creek runs over natural contours through trees

49site





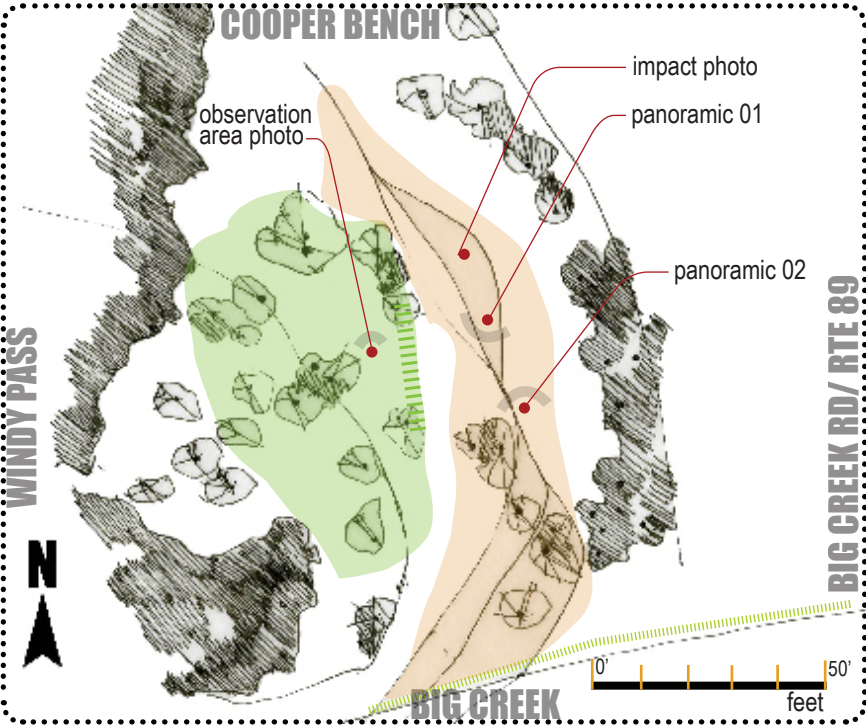
- _user created trails braid through the site, as a shortcut from Cooper Bench to the banks of Big Creek.
- _natural gully helps contain drainage from the hillside above.
- _groves of conifer trees, varying in species and height. This site shows the stratified layers of forest as some trees grow in the canopy of others.
- _trails continue to cut through the rich soil, spraying sediment.
- _designated Big Creek trail goes to Windy Pass

site 50

Adjacencies

The approach to the Big Creek trail shows heavy evidence of timber and fire management. I came upon trail damage from what looks like motorcycle use that braided gullies in the soil down the site, cutting across the designated trail and continuing all the way down a user created trail to reach the creek bed. This site spoke mostly about forest and habitat to me, as it sits adjacent to the Grizzly Recovery Zone, and the forest's old growth provides shade for the many species that live under the canopy. Wildlife is especially affected by motorized travel due to the noise. The impact zone is highlighted in orange as the trail cuts, and the natural observation zone is in green, a beautiful mixed conifer grove, because I wanted to highlight the appreciation for the forest in this site.

51site



observation zone



impact zone



natural preventing threshold



Latitude - 45° 18' North
Longitude - 110° 56' West³⁷
Elevation- 5889'³⁸

Average Annual Precipitation: 30-40"
Prevailing Wind Direction: W
Potential Conifer Species: Douglas Fir, Engelmann Spruce, Subalpine Fir, Lodgepole Pine, Whitebark Pine.³⁹

Sun Angles:
December 21, 12:20pm - Altitude: 21.6° Azimuth: 175.5° E of N
June 21, 12:20pm - Altitude: 68.4° Azimuth: 178.8° E of N⁴⁰

site52



panoramic 01



panoramic 02

53site





impact photo- orange lines delineate the eroded paths



observation area photo

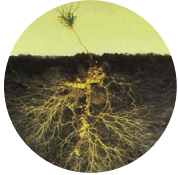
site54

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Efficiency of Systems

Shows an understanding of the way structural systems, mechanical systems, and programing can interact and overlap to promote efficiency. Efficient systems use renewable energy sources to create desired output. Ultimate sustainability uses waste product as input for system.



Adaptable Designs

Adaptable designs embrace flexibility by allowing for change in form or use to accommodate new purposes. Adaptability is essential when trying to design for active ecosystems. Nature is highly adaptable in ways that ensure survival of species.



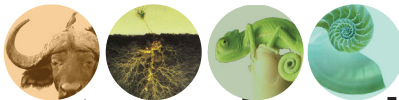
Symbiotic Relationships

Symbiotic relationships represent two sides of an interaction benefiting from each other in some way.



Efficiency of Form/Purpose

A design shows efficiency of form/purpose when its form is directly derived from its purpose. It implies that there is no waste in materials, and no part of the form is extraneous.



watershed

by FLOAT design

“ . . . designers must leave behind question of ‘using up less’ and make buildings that contribute more to functioning ecosystems by generating resources that can be used by other parts of the system, by designing buildings that establish reciprocal relationships with their contexts.”
-Float- Erin Moore ⁴¹

57 precedents



P21

The small structure is used as a study place to observe the fragile wetland ecosystem on the banks of the Marys River, in Wren, Oregon. The butterfly roof catches rain and channels it into a reservoir by the front door. This water source brings wildlife around the studio to drink.

I chose this precedent because it shows evidence of all of the above valuable characteristics. The design creates a symbiotic relationship between the client and the natural environment; wildlife drink from its front step and the client gains respect for the surrounding ecosystem’s needs by studying it, and in turn protects it. The structure displays efficiency of systems through its use of water catchment, and its structural system. The building lightly touches the ground at only four points and is supported above the fragile ecosystem by a steel frame.

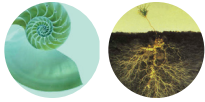


P22

Moore considers adaptation as a solution to sitting a static structure on an organic, dynamic base. “I had to figure out how to build on riparian areas, which are always changing,” says Erin. “I tried to make an architecture that responds to shifting ground, instead of stabilizing it.” Her figuring includes sinking concrete piers into the protean earth, affording the retreat both stability and a bit of give.”⁴²

The design also shows an efficiency of form and purpose. The small footprint and simple design houses the minimum program requirements. The penetrations through the walls also speak directly to the function, as they frame the surrounding environment for focused study.

precedents 58



hippo roller

by Project H

The Hippo Water Roller Project aims to improve global access to water by making it possible to collect 24 gallons (90 liters) of water- five times the amount possible using traditional methods - in less time and much more easily.

-www.hipporoller.org⁴³

59 precedents



P23



P24

“The Hippo’s innovative design allows water to be placed inside its “wheel,” transforming 200 pounds (90 kg) of water to an effective weight of just 22 pounds (10 kg). This means that almost anyone can easily manage a full roller over most types of terrain.”⁴³

The hipporoller shows efficiency of form/purpose and efficiency of systems because its form is edited down to only what is needed to perform efficiently. The systems are integrated because the cylindrical shape used to roll over the ground is also used as a container for water. Scientifically the lessening of the effective weight is the most efficient use of systems, by reducing the amount of energy input required to historically do the same task.



This precedent shows efficiency of form and purpose because its characteristics are directly derived from its purpose. The long slender handle is used as a hand grip and its length is effective in creating more momentum to turn the pipe fitting. The wrench is made of metal because it can be cast to the most precise size for its purpose, and the strength and stability of the material allows for the teeth to grip to the pipe. The tool also is an example of an adaptable system, as the head can move up and down to accommodate all sizes of pipes and fittings.



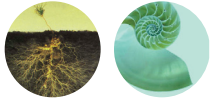
pipe wrench

Daniel C. Stillson, patent 1870

P25

The pipe wrench, or Stillson wrench is an adjustable wrench used for turning soft iron pipes and fittings with a rounded surface. The design of the adjustable jaw allows it to rock in the frame, such that any forward pressure on the handle tends to pull the jaws tighter together. Teeth angled in the direction of turn dig into the soft pipe.”⁴⁴

precedents60



zig zag house

by Drew Heath Architects

This project is an attempt to make an architecture predicated on a questioning of client requests, and realized through formal invention and structural ingenuity rather than large-scale solutions.

-Brett Boardman ⁴⁵



P26

61 precedents

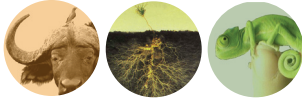


P27

The Zig-Zag house embodies a respect of place and its surroundings. It was designed with careful consideration of the act of observing the natural environment. The form is entirely resourceful and void of excess, making it an excellent example of efficiency of form/purpose. Heath taps into the idea that minimal interior living requirements can bring us into a heightened relationship with the exterior. The building also shows efficiency of systems in its use of water catchment, and passive solar design. The water catchment and tank is set up the hill from the building to take advantage of gravity flow. The window placement and size is so precise that the building can take advantage of thermal gain, without the use of exterior sun shading devices.⁴⁵



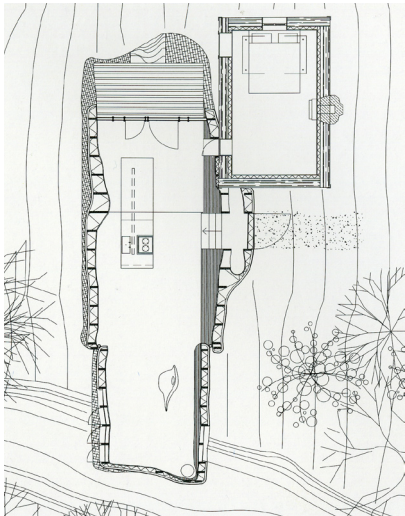
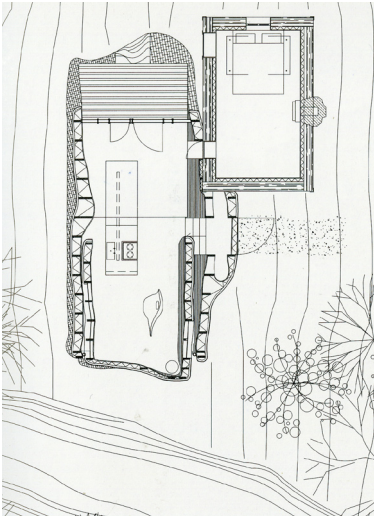
P28



ove glas house

by 24H Architecture

Using a system of pulleys and a steel frame mounted on roller bearings, the structure can be easily changed by just one person.⁴⁶



P29

63 precedents



P30

This building embodies adaptability in the way that it changes size and gains square footage when inhabited. Because of its temporary use, it only needs to be a certain size when people are using it. The systems used are very efficient in that it only takes one person to glide the extension out. This is especially important because many adaptable systems in buildings are not used due to the lack of mechanical ease. The building also takes advantage of solar gain, but recognizes that solar gain and ventilation is only needed when inhabited, so the extension is the only part of the building that has those characteristics. The symbiosis comes in part by allowing the building to gain square footage without compromising the ground vegetation and soil of its surrounding environment. The human user can observe their surroundings without impacting them in a negative way.⁴⁶

precedents 64



billfold

Billfolds were developed after the introduction of paper currency to the West in the 1600s . . . Wallets are usually designed to hold banknotes and credit cards and fit into a pocket. . . . Wallets usually have one or more pockets for storing credit card or identification cards, which may be oriented vertically or horizontally.⁴⁷

65 precedents



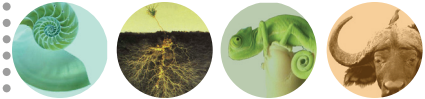
P31

I found this precedent to be an excellent example of adaptability and efficiency of form and purpose. When folded the billfold is designed to fit into a pants pocket. When closed, it also creates a friction between the three folds that keeps the contents in place. It adapts by opening up, and releasing the friction, when people need to take things in and out of it. Its design comes directly from its use; because of the differences in material quality of paper currency compared to identification cards and credit cards, they each inhabit the billfold in different ways. While the id cards and credit cards fit into one panel of the billfold, the paper can be bent so it can stretch along all three folds of the wallet.

The leaves catch the sun's light and through photosynthesis, provide oxygen to the atmosphere and food to the tree. It adapts to the winter by shedding its leaves and growing them back once the warmth returns.⁴⁸ Trees also show adaptation at high altitudes, where there is less nutrients and the temperature is lower you often find stunted trees, growing to only the size they can self-sustain. I chose the tree as a precedent study because it embodies all the characteristics of an efficient building.



P32



tree

The tree's structure and biological functioning make it arguably the most efficient system in the natural world. The roots grow deep and wide into the ground to effectively support the vertical cantilever of the tall trunk, and also provide stability to the soil. The structural quality of the roots is also paired with the biological functioning as the roots use their extension to access water and nutrients in the soil. Trees have symbiotic relationships with almost every other species on earth. They provide oxygen for all living things, as well as shade for the health of the soil and vegetation living under its canopy.



bay of fires

by Ken Latona

“The form and the fabric of the building reflect high environmental aspirations: solar panels to power lights and fans that ventilate composting toilets and drive gas-fired convection heaters; large areas of louvered glass to improve day lighting and ventilation and a hand-pumped water supply system which is then fully treated and recycled.”⁴⁹

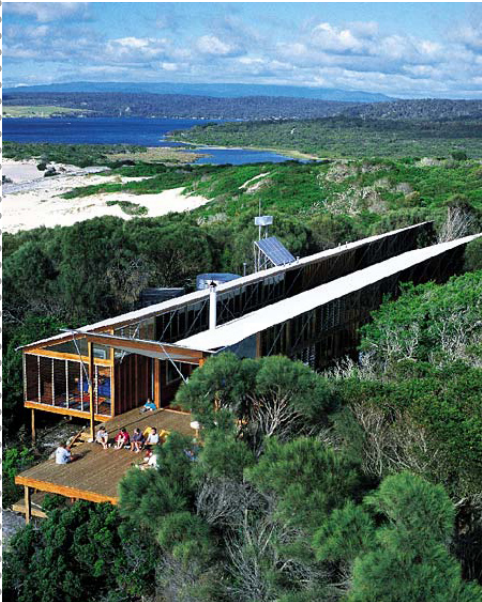
67 precedents



P33

“The theme of light, linear pavilions with curved or skillion roofs, sometimes linked by outdoor spines, has been a fertile field of exploration in recent Australian architecture: and is especially fruitful for inserting buildings into sensitive rural sites with minimal cut-and-fill and for encouraging cross-ventilation and winter sun penetration. Latona’s lodge demonstrates the continuing versatility of this type, here used in an unlikely context. The building straddles the ridge of the knoll, just below the summit. Unlike most other buildings of this type, the pavilions do not face the prospect, but peer into the bush: only at the eastern end do they look out to the wider landscape. With so much time being spent outdoors, this seems an appropriate response. It also provides shelter from coastal winds and limits the visual impact on the surroundings to one side of the hill, where the gables and deck project out of the trees above a small beach. The siting took advantage of natural clearings, necessitating removal of only three trees.” -Rory Spence ⁵⁰

This precedent, set in Mount William National Park, I found to embody many of the above characteristics. It shows efficiency of systems through its use of the aforementioned technology. Its efficiency of form and purpose is shown through its delicate connection with the ground and its precise fit into the landscape. It is a product of its environment, and it shares a symbiotic relationship with the surrounding nature as it inhabits a natural clearing. The rich encompassing ecosystem is left untouched, yet appreciated by visitors by the building’s careful framing of the views and landscape. The building has no vehicular access and the entire project was constructed by walking materials in, or by use of a helicopter. ⁴⁹



P34



crate house

by Alan Wexler

Crate House consists of a 'packed' dwelling that contains all the objects we are accustomed to having around us in a comfortable house. Seeing these in a form that can be transformed into an instantly anonymous, shippable object questions the true character of the modern home.⁵¹

69 precedents



P35



P36

"In Crate House, Allan Wexler has devised an ingenious system whereby four functions of living can be separately accommodated in one 7 foot square room. Four plywood crates, containing the essential elements of a kitchen, bedroom, living room and bathroom, are located on the outside of the small "house" and can be rolled into it, one at a time, as desired."

52

This precedent considers efficiency of form and purpose because its design is a direct derivation from human activities. It is a log of all the necessities of human life, and is stripped down to accommodate only what is necessary. It is extremely adaptable in that the separate pods are on wheels and can be rolled into a holding box when not being used, or rolled out and used separately in another context.



P37



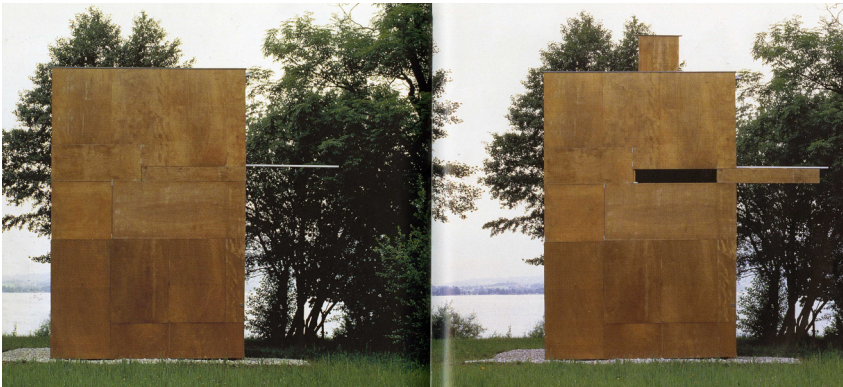
gucklhupf

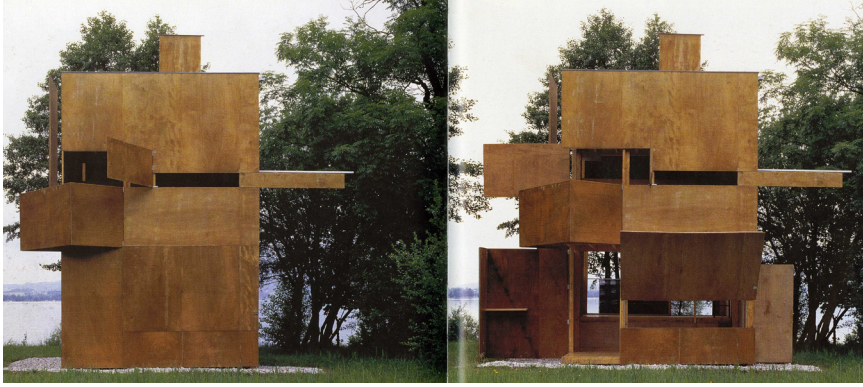
by Hans Peter Wornld

“Passive and active, the name serves to reinforce the dichotomies that underlie the project: strange and familiar, habitation and travel.”⁵³

This quote speaks to the adaptability of the installation/building. It can be more than one thing at different times.

71 precedents





P38

“GucklHupf represents the disintegration of the conventional cocoon of the house, exposing the heart of the home to the ‘outside.’ . . . by hand activating the sliding, tilting and turning mechanisms attached to mounted plywood panels, the windowless box dissolved in infinite variety, at once framed in the landscape and framing it.”⁵³

I chose this building to represent adaptability and efficiency of form/purpose because it was designed to show the contrast between excluding nature (closed position) and then inviting nature (open position). GucklHupf was originally designed as an installation, and that intent in itself is an important way to control a building’s impact on its environment. To install a building in a specific site to enhance people’s perception of nature, but then to remove it so as not to permanently damage the natural environment is an excellent example of symbiosis.

73 implementation:

The solution is a building prototype that can be transported from one site to another to act as a temporary interactive interface between the human, the dwelling unit, and the environment. The prototype embraces modular characteristics for ease of construction, production, and transport; However, it also has the capacity for flexibility of design, so it can have a direct and unique reaction to each individual site.



implementation 74



75 implementation:

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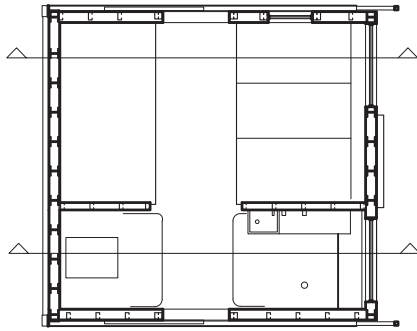


implementation 76

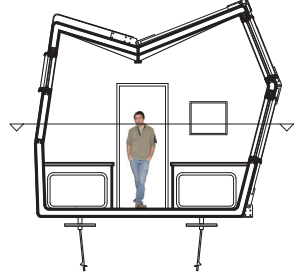
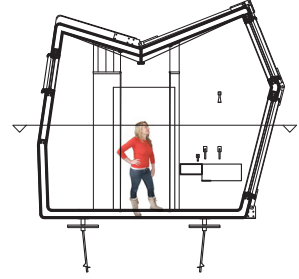


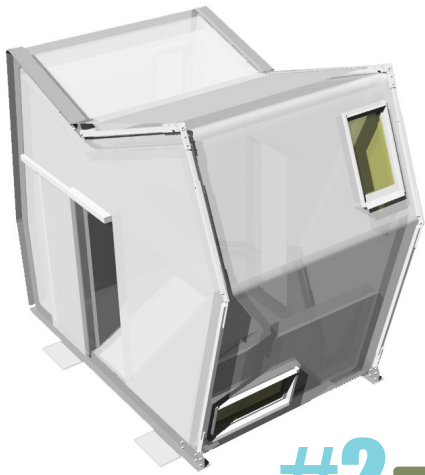
#1 introspective
contained
warm
water
light
noise
non-directional
semi-private

77 implementation:

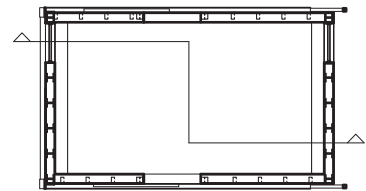
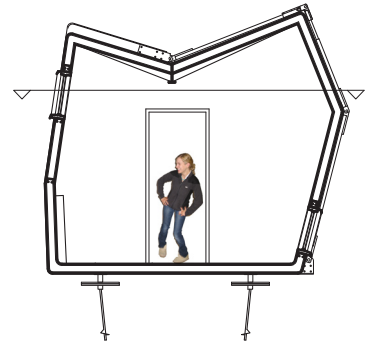


plan of pod #1
scale = 1/4" = 1'-0"



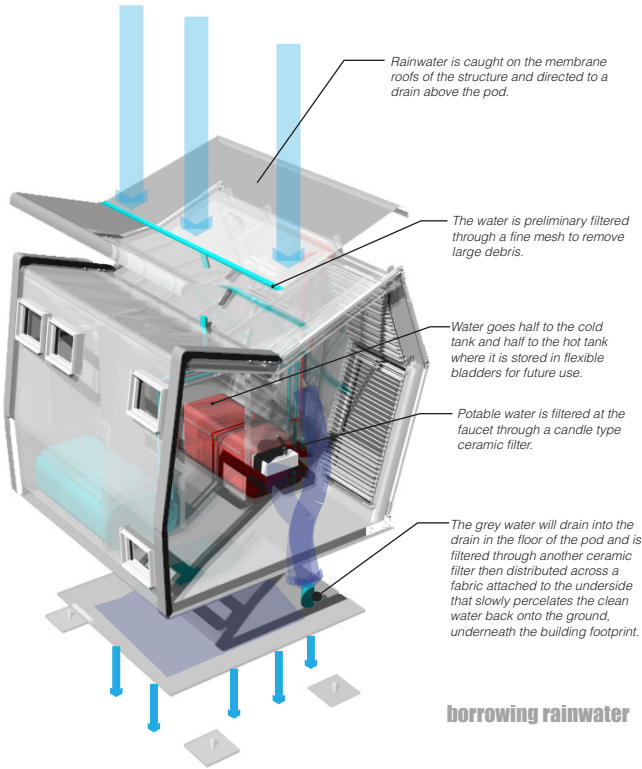


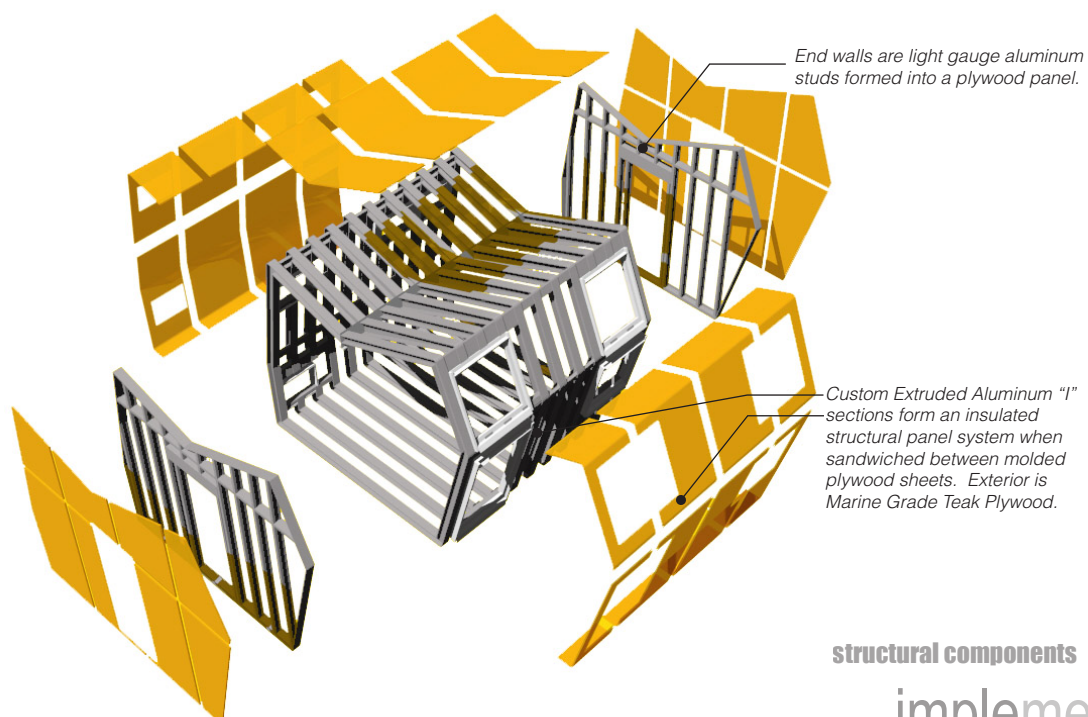
#2 ■ introspective
contained
tempered
no need for water
dark
silent
non directional
private



implementation 78

79implementation:





structural components

implementation80

Frame Potential
qualities of space

#1

introspective
contained
warm
water
light
noise
non-directional
semi-private

with the flexible capacity for:

extrospective
active
cool
dark
directional
private/public
all observation levels

#2

introspective
contained
cool
no need for water
dark
noise
non directional
private

with the flexible capacity for:

extrospective
warm
light
directional
public
all observation levels

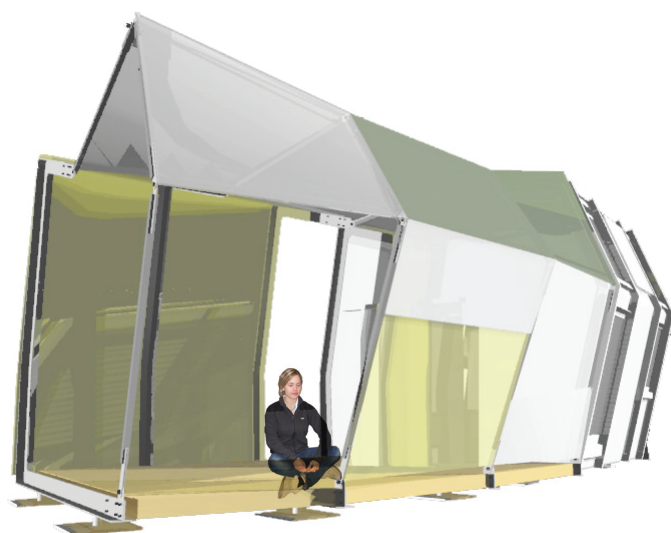
#3

extrospective
active
tempered
no need for water
light
noise
directional
public

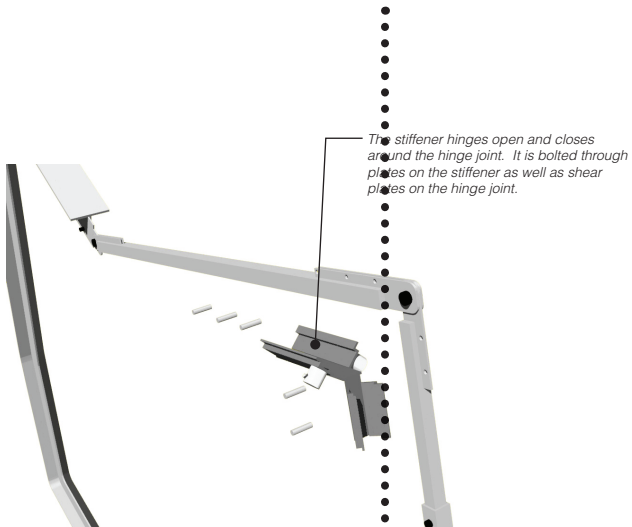
with the flexible capacity for:

introspective
warm
dark
non-directional
semi-private

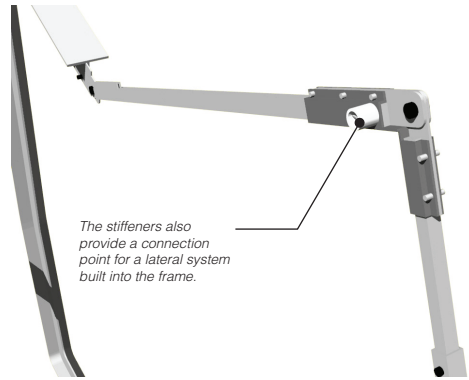
81 implementation:



implementation82



CUSTOM STIFFENER PIECE:
 This piece is custom for each joint. It allows for full flexibility of the frame. With each joint able to rotate freely, the frame can be manipulated for different positions just by designing and manufacturing a new stiffener.



83implementation:

fabrics

PROTECTIVE:
Flexible, shell material, darker value to block sun, provide protection from the wind and rain.



Outer Layer:
Nylon Ripstop Water-resistant Breathable Fabric
class A fire retardant

CALMING:
Soft, natural fabric, slightly translucent, light color to diffuse hard sun-light to create a subtle glowing interior. Provides privacy but lets light in.



Interior Layer:
White Linen- Calder "like linen"
class A fire retardant

INVISIBLE BARRIER:
Soft netting, allows all light to penetrate into space, allows for views out of space, provides comfort from biting insects in an exterior open space.



Middle Layer:
Mosquito Netting
class A fire retardant

INSULATOR:
Volumous waterresistant down fabric, provides insulation during the night when heat would escape from the pod windows.



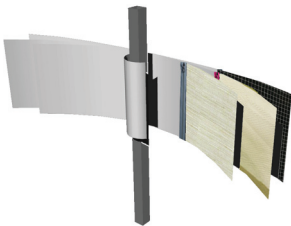
Window Zipped-In Inserts:
Reclaimend Custom Down Jacket Panels
class A fire retardant

THERMAL COMFORT:
Phase Change material that regulates interior temperature, storing excess heat and releasing it back into the space once the ambient temperature drops.



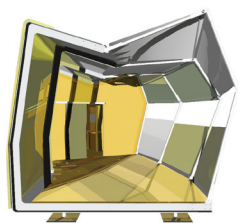
Upholstry, Removable Wall Fabric:
Outlast Advantage Thermocules PCM
class A fire retardant fabric laminate

**For future flexibility new fabrics can achieve a Class A Fire retardant rating through a variety of coating dips which comply with ASTM-E84 Class A Flame Spread Standard.

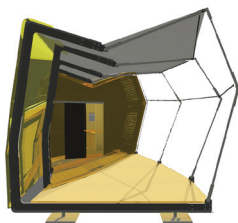


FABRIC CONNECTION TO THE FRAME:
The fabric swatch wraps around the frame and velcros to close. Each fabric swatch can be zipped in, and out, and anywhere in between. Taking inspiration from tent design, layers of the fabric can be rolled back and fastened to the frame with string.

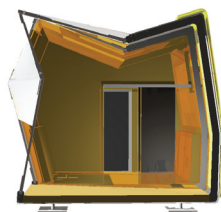
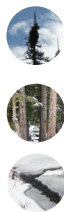
abric/Frame Potential
qualities of space/activities



yoga for 3
riparian site



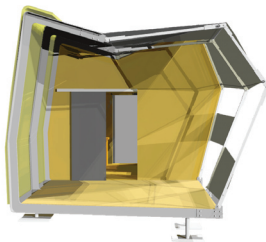
lunch for group
riparian site



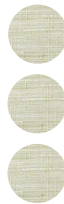
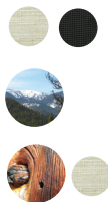
sunset for 2
forest habitat site



sleeping for 4
riparian site

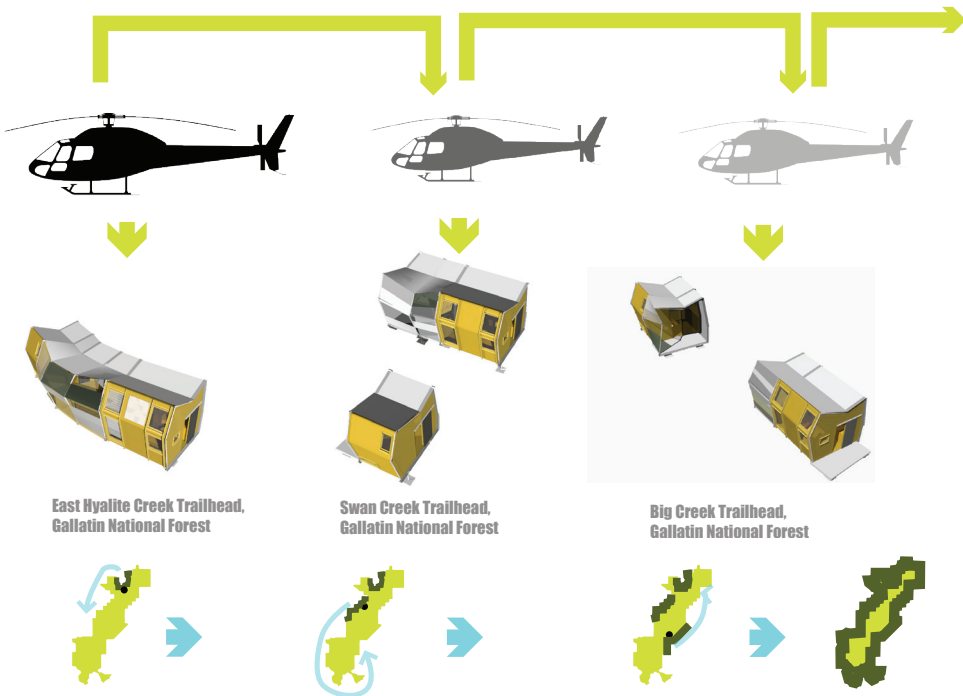


observing for 4
bank site



sunrise for 2
forest habitat site

85 implementation:



East Hyalite Creek Trailhead,
Gallatin National Forest

Swan Creek Trailhead,
Gallatin National Forest

Big Creek Trailhead,
Gallatin National Forest

The future implications of this process are that all the damage on the periphery will be remediated, the border is reinforced, and eventually the wilderness areas can be linked through their peripheries, and their wilderness cores protected by each other.

Notes/Resources:

01: Ian McHarg, [On Landscape Urbanism](#) pg 11
02: US Bureau of Reclamation
03: Aldo Leopold, [Sand County Almanac](#) pg 21
04: US Census Bureau
05: Clark Stevens, [On Landscape Urbanism](#) pg 258
06: [www.guardian.co.uk/science/2005/mar/30/environment.research](#)
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08: Anne Whiston Spirn, [On Landscape Urbanism](#) pg 54
09: Clark Stevens, [On Landscape Urbanism](#) pg 258
10: Clark Stevens, [On Landscape Urbanism](#) pg 258
11: 2006 International Building Code
12: [www.greateryellowstone.org](#)
13: [www.wilderness.net](#)
14: [www.greateryellowstone.org](#)
15: USFS Hyalite Porcupine Buffalo Horn Wilderness Study Area
Wilderness Character Assesment.
16: Kimberly Shlenker, USFS
17: [www.gallatinwilderness.org](#)

18: Robert Stone, [Day Hikes Around Bozeman Montana](#) pg 111
19: [www.fs.fed.us/rl/gallatin](#)
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21: Robert Stone, [Day Hikes Around Bozeman Montana](#) pg 111
22: Google Earth
23: USGS Fridley Peak Map
24: [www.wrcc.dri.edu/](#)
25: [http://aa.usno.navy.mil/data/docs/AltAz](#)
26: Robert Stone, [Day Hikes Around Bozeman Montana](#) pg 134
27: Phil Knight, Montanans for Quiet Recreation
28: [fwp.mt.gov/fishing/guide/report](#)
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30: Google Earth
31: USGS Hidden Lakes, Garnet Mountain, Mt Blackmore, The Senti
nel Maps
32: [www.wrcc.dri.edu/](#)
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38: USGS Lewis Creek Map

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- 40: <http://aa.usno.navy.mil/data/docs/AltAz>
- 41: www.floatarch.com
- 42: Britt, Aaron. "Mother's Nature," Dwell Magazine. October 2008. pg 132-134
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- 45: Boardman, Brett. "Zig Zag Cabin," architecturemedia.com
- 46: Kronenburg, Robert. Flexible pg 47-49
- 47: www.wikipedia.org
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- 49: The Phiadon Atlas of Contemporary World Architecture pg 64
- 50: Spence, Rory. "Sublime Camping," architecturemedia.co
- 51: Kronenburg, Robert. Flexible pg 157
- 52: www.umass.edu/fac
- 53: Goodwin, Sally "The Gucklhupf," Architectural Design. John Wiley and Sons Limited. Vol 70 No 4. pg 89

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P02: www.lightrailnow.org/images/mil-hwy-fwy-sprawl_cnu.jpg
P03: Stock photos Dell
P04: Google Earth image “Big Sky Montana”
P05: www.avalanch-center.org
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P20: US Forest Service, Gallatin National Forest
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P38: Goodwin, Sally. “The Gucklhupf,” Architectural Design. John Wiley & Sons Limited. Vol 70, no4. pg 86-89.

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