Protect
Restore
Connect

Using Architecture To Help SAVE THE REDWOODS

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Using Architecture to Help Save The Redwoods

A Design Thesis Submitted to the Department of Architecture at North Dakota State University
By Ian Foster
In Partial Fulfillment of the Requirements for the Degree of Master of Architecture

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NDSU Design Thesis

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Introduction

Project Abstract

In the recent past we have seen a rapid decline in the presence of old-growth Redwood groves, particularly Coast Redwoods groves in northern California and southern Oregon. For various reasons, we have been losing these very valuable ecosystems and iconic stands of trees at an alarming rate. There are multiple organizations and programs that are trying to help these trees, but a lot still needs to be done. Especially, when it comes to public perception, understanding, and our willingness to help save the Redwoods.

Through various research methodologies including the use of historical documents and accounts, interviews with related professionals, case study examinations, and more, many different topics were explored in depth. All helping to inform and improve the ideas imagined.

Improving the visitors experience in these ancient Coast Redwood groves could be very beneficial to ongoing conservation efforts. These experiences could be welcoming to visitors, full of educational information, and inspire people to connect with these Redwoods at a deeper level. These experiences could also include access to some relevant research data and important forestry work as a part of the educational resources.

Project Narrative

In the world of conservation there are few words more important than protect, restore, and connect. These three words help to provide a basis for creating a solid and sustainable foundation for environmental conservation. And, in that same world, there are few conservation efforts more important than the ongoing preservation of the Coast Redwood trees in Northern California and Southern Oregon.

The Coast Redwood (Sequoia sempervirens) is a magnificent tree, they are incredibly old, extraordinarily tall, unbelievably wide, and can live for thousands of years. Redwood leaves have been found dating back 200 million years, meaning that these trees were standing tall while dinosaurs shook the earth. The tallest Coast Redwood standing today is “Hyperion”, the tallest tree in the world. “Hyperion” is located in Redwood National Park and was measured at 379.9 feet tall in 2017. “Lost Monarch” is the widest Coast Redwood standing today. This tree, also located in Redwood National Park, is 26 feet in diameter at its widest point, making it as wide as three school buses. And these trees live for a long, long time. “Helios”, the second tallest tree in the world, is 2,050 years old. These trees have had a long time to adapt and evolve, and they have done just that. Easily becoming some of the most impressive tree species around.

In prehistoric times, the trees covered large portions of current day United States, parts of Europe, and had some presence in Asia. The trees thrived in the warm and wet climates of those times. But since the earth has morphed and changed in the time since, the trees natural range has shrunk to just 400 miles along the coasts of Northern California and Southern Oregon. These foggy shorelines are the only place the trees have been able to survive on their own.

For thousands of years though, people have known about these trees. Many tribes in the Northwest lived inharmony with the trees. The Yurok tribe is a great example. To the Yurok the keehl, or redwood tree, was a sacred living being. They fished, crafted, told stories, sang, danced, healed, in the shadows of the keehl. They would make houses, sweathouses, canoes, stools, trunks, and countless other tools from the keehl. The Yurok would not cut down the trees, as they saw them as guardians of their sacred places, and instead they would use what the forest gave them, they would use fallen trees for their needs.

The Coast Redwood tree plays an invaluable role in the environments is a part of, on both a large scale and a small scale. On a large scale, the old-growth forests that thrive in Northern California and Southern Oregon are made from some of the lushest trees on the planet. And with their enormous height, this creates some of the densest forests on the planet. From the forest floor to the upper canopy, there is life everywhere. Because of this, per acre, old-growth Coast Redwood forest are able to capture more carbon from the atmosphere that almost any other land area on earth. Then, on a smaller scale, when considering all the layers and complexity of life in a redwood forest, you can only imagine the number of plants and animals that rely on these trees for survival. There are many things that are born in branches of these trees and never leave. More than 200 species of animals rely on these trees and 28 of those are on the endangered species list.

These trees are amazing. For millions of years, they have had a chance to compete in the evolutionary arms race and try to survive. They have developed protections against fire, drought, floods, rot, insects, fungi and more. These trees are tough, but not quite tough enough.

“There are few conservation efforts more important than the ongoing preservation of the Coast Redwood trees”

In the early 1850’s California was a destination for tens of thousands of adventurous fortune seekers. With the discovery of gold, people saw an opportunity for a fresh start and a chance to change their lives, so they flocked to the territory. With the large influx of people, a lot of the land was soon to be explored, and a lot was to be discovered. In May of 1852, a hunter for a mining operation was tracking a bear that he had shot. As he tracked it, he eventually stumbled into a grove of trees, trees that he had maybe heard whispers of, “the trees taller than buildings”, the Redwoods. This hunter, Augustus T. Dowd, went back to camp to tell everyone about his discovery. Having a bit of a reputation for telling some tall tales, he was not believed at first. But eventually, he was given credit for finding the aptly named “Discovery Tree”.

Figure 1

No one knew it at the time but from that point forward, the fate of the Redwood tree was in grave danger. With so many people in the area looking for an opportunity to make some money, some saw that opportunity not in the gold mined, but in the forests. Sawmills went up quickly and the trees came down at the same rate.

In 1850 there were 2 million acres of old-growth Redwood Forests along the shores of Northern California and Southern Oregon. For 200 million years these trees had prospered in this area, but now, just 150 years after being found by settlers, just 100,000 acres remain, just five percent. And of that five percent, just 20,000 acres are protected, or one percent. There were no efforts to slow the logging of the tree for about 50 years.

Figure 2

One of the first organizations to step up, was the Save the Redwoods League. The league was formed in 1918 by three prominent conservationist. Persuaded to take a trip to survey the state of the Redwood Forests of Cali-fornia and Oregon by the National Parks Director Stephen Mather, John C. Merriam, Madison Grant, and Fairfield Osborne headed west. When the tree arrived in northern California, they started their trip down the Redwood high-way. After witnessing the disturbing rate at which these trees and their natural habitats were being destroyed, they decided to do something. Together, these three vowed to launch a movement to save the redwoods. In March of 1918, with donations from Stephen Mather, E.C. Bradley, William Kent, Fairfield Osborne, and Madison Grant, the Save the Redwoods League was formed.

The League got started right away and began purchasing land, pushing for the development of a state parks system, established nurseries, and more. The mission of The League is to “protect and restore California redwoods and

“protect and restore California redwoods and connect people to the peace and beauty of redwood forest”

connect people to the peace and beauty of redwood forests.”The League protects Redwoods by “purchasing redwood forests and the surrounding land needed to nurture them.” The League restores Redwood forests by “innovating science and technology that can improve stewardship and accelerate forest regeneration.” And The League connects people to the Redwoods by protecting and restoring thousands or acres or forest and creating 66 redwood parks and reserves.

Figure 3

Project Goals

I have always appreciated conservation. Our natural world is incredible. It is beautiful, it is powerful, it is ever changing, and it is everywhere. Unfortunately, as we as humans grow and develop, we infringe on nature, and we often do this with no regard for anything but our interests. It is sad to see all the ecosystems destroyed by our careless expansion and I hope that we can change our ways and live in harmony.

I was lucky enough to visit these trees in 2016 and was impacted by their size and at their story. When it came time to think about my thesis project, I knew that I wanted to help the Redwoods. So I asked my self “How can architecture help Save the Redwoods.”

My goal is simply to help save the Redwoods. Through architecture I think this is most easily done by creating user experiences that are truly impactful and inspiring. If no one cares to help these trees, nothing is going to happen. To ensure not only a secure future, but a prosperous one, for the Redwoods of Northern California and Southern Oregon, we need to make sure that people care about the trees. And one of the best ways to do that is to expose people to the trees. Simply give them a chance to appreciate the Redwoods.

“How can architecture help Save the Redwoods?”

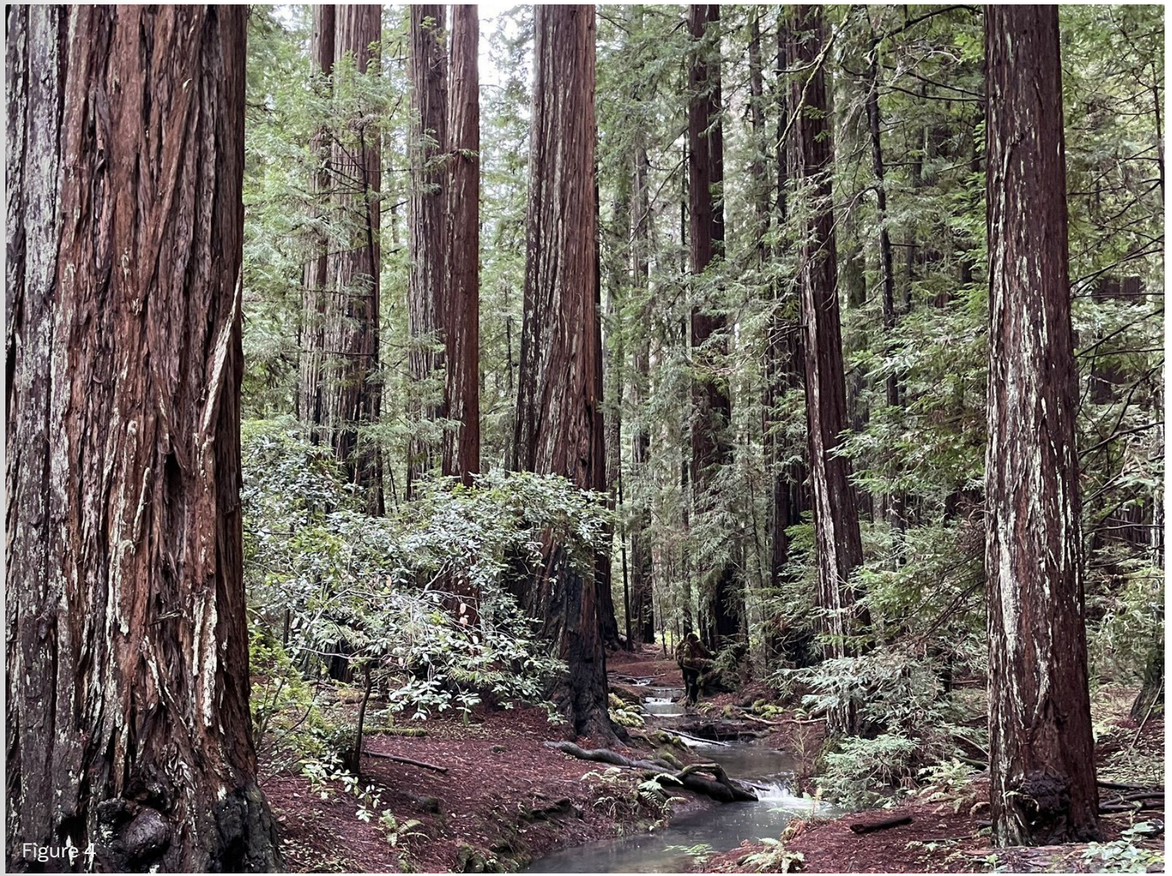
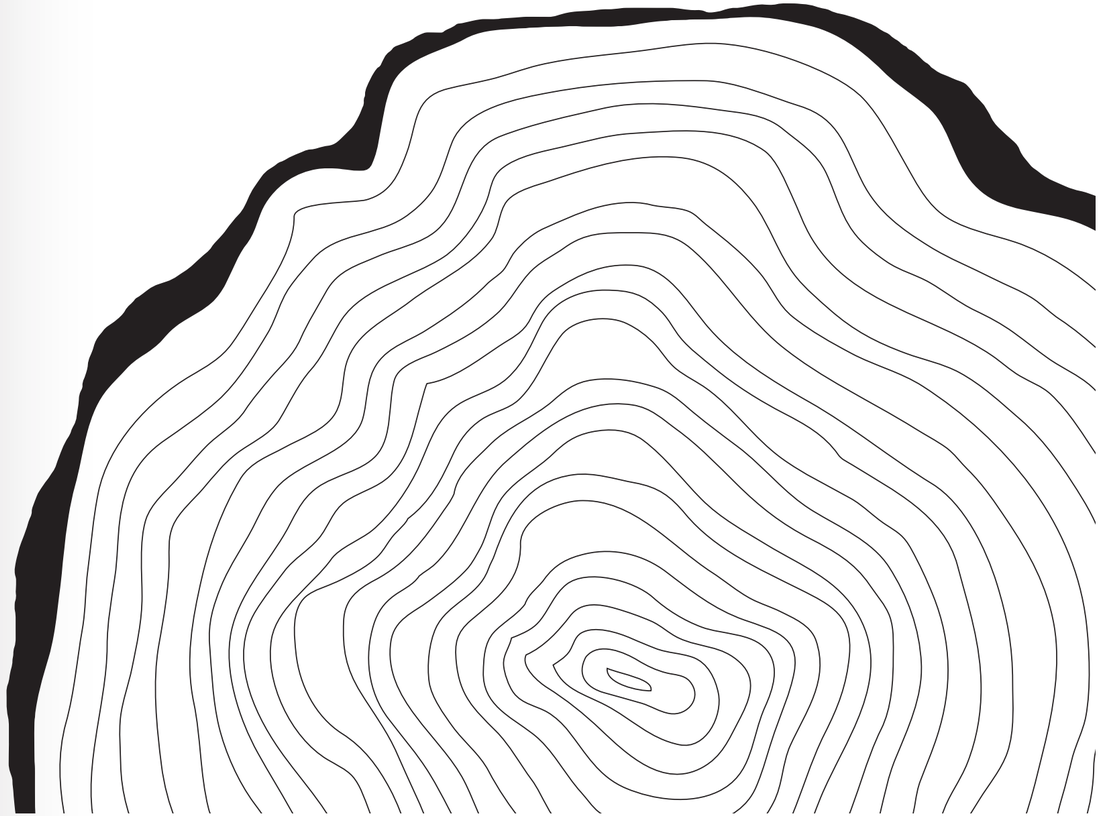


Figure 4

Research



Leadville National Fish Hatchery Case Study

The Leadville National Fish Hatchery, located at the base of Mount Massive near Leadville, Colorado, is the second oldest federally operated fish hatchery in operation today. Siting at 10,000 feet of elevation on 3,072 acres of the Hatchery is surrounded by vast subalpine forests, ponds, creeks, and miles of trails, the hatchery attracts plenty of visitors. The waters that surround the facility were once home to the Greenback Cutthroat Trout, Colorado's State Fish, which was once thought extinct. But now, thanks to work from the Leadville National Fish Hatcher itself, the Greenback Cutthroat Trout thrives all throughout Colorado.

The hatchery complex includes 13 buildings, 16 growing ponds or raceways, parking, and trail access. Buildings include, offices, residences, and a few laboratory spaces. The lab facilities include spaces for the extraction of sperm, insemination, hatching, growing, packing, and transporting, and more.

The site also has a culture shop, a visitor center located in the historic hatchery, and a display pond. These supplementary buildings provide visitors with exhibits about the history of the site and a behind the scenes look into the operations of the hatchery.

Figure 5

Figure 6

Tillamook Forest Center Case Study

Located in the heart of the Tillamook State Forest, the Tillamook Forest Center gives visitors access to wonderful experiences and interactions with the forest as it is today and the forest as it was. In the 1930's and 40's fires swept through the forest and decimated the almost the entire forest multiple times. In the years that followed massive replanting efforts were under way. Today the Visitor Center sits in a diverse and healthy forest, a testament to forest management practices and learning from the past.

The 13,500 square foot building includes, an entry and welcome area, exhibits, a theater room, a classroom, a gift shop, and administrative spaces. All of these spaces are laid out in the building in a very liner manner, making it easy to tell the story of the forest through time and increase the interaction of visitors with the different spaces. This design was inspired by some historic structures commonly seen throughout the lumber industry. Materials were selected in this same manner and are representative of the site and the buildings subject matter.

The project includes a 250' foot bridge that spans the Wilson River and connects to the expansive trail network in the park. The project was built on piles to reduce the earthwork required for the site. These also lift the building off the ground a little and help reduce the amount that the building disrupts the natural flow of water on the site. The projects construction started furthest in and then backed out to reduce the disturbance of the area during the process.

Mesa Verde National Park Visitor and Education Center Case Study

The Mesa Verde National Park Visitor and Education Center is the first stop on anyone's trip into Mesa Verde National Park. The building is located right next to the main entrance to the park and welcomes all guests. Located right off of Highway 160 the location is an improving to the Far View Center, the parks old visitor center, that was located 15 miles into the park. The visitors center welcomes 550,000 visitors to the park each year.

The project sits on 105 acres of land in the national park. The architects on the project were from ajc architects and the landscape architects were from Landmark Design Inc. The design of the building and landscape was aided by 24 tribes and pueblos. Serving sources of information to help throughout the entire process. The project was budgeted at $14 million and ended up costing $12.1 million.

The building serves as the main facility for information in the park and as a research and storage facility for the parks large archive of over 3 million artifacts. The education part of the project includes exhibits about modern decedents of the Ancient Pueblo people, the parks museum and research collection, the projects LEED platinum achievement, and various other artworks and sculptures that represent the area and its native inhabitants. Of course, there is access to restrooms, trail guides, maps, a bookstore, and more.

Figure 7

Figure 8

Pikes Peak Summit Visitor Center Case Study

Sitting at the top of Pikes Peak, near Colorado Springs, is where you will find the Summit Visitor Center. The visitor center, finished as recently as 2021, is where the more than 500,000 annual visitors can take a break after getting to the top of the 14,115 ft peak. Here you can take a seat and enjoys spectacular views, get a bite to eat, learn about the history of the mountain, or more.

The project is a 38,000 square foot facility that looks like it is maybe a quarter of that size as you approach it. The building includes exhibit spaces, a dining area, a gift shop, restrooms, and three outdoor deck areas. Incredible views of some of Colorado's most beautiful ranges are present throughout. Some of the outside is brought in through the use of rustic colors and warm materials like locally sourced timber and stone.

The building has achieved LEED Silver Certification and it has also met the Living Building Challenge, the first building in Colorado to do so. These accomplishments were made in large part due to the buildings use of daylighting, highly insulated shell and in floor radiant heating, solar panels, an intricate water preservation plan, and by using local non-toxic materials. The site presented plenty of design and logistical challenges, but it overcame them all and stands proud atop the most visited 14er in the US.

Peter Gag Interview

Peter Gag, from the North Dakota Forest Service, helped provide some insight during the development of the project. Peter is a forester and has spent large chunks of his life working in forest across the United States. One especially interesting experience lasted seven years when he worked at the remote Taylor Wilderness Research Station. The Taylor Wilderness Research Station (TWRS) is located deep in the Frank Church Wilderness in central Idaho. Here, Peter and his wife ran the facility. With the help from students and summer interns, they collected data for the University of Idaho and organizations like the National Oceanic and Atmospheric Administration, the Fish and Wildlife Service, and the National Aeronautics and Space Administration.

The TWRS complex is made up of 17 different structures. Six for housing people, including a cabin, a bunk house, and more, one lab building, one cook house, some sanitary facilities, and plenty of storage, maintenance, and energy sheds (shed that help

"The TWRS complex is made up of 17 different structures"

equipment for the complexes hydro and solar power collection systems). Since the station is located so deep into the Frank Church Wilderness, it is only accessible by plane or a long 14 mile hike from some of the nearest backpacking trails. Because of this isolation the facility needs to be self-sustaining, and the workers have to do all the maintenance work leading to a large number of facilities dedicated to upkeep.

Since the research station is a part of the university, there are often students that live, work, and even take classes at the TWRS. There are two main programs that help students gain access to the facilities, summer internship programs and a "Semester in The Wild" course of study offered at U Idaho. For the summer intern ships, something like six students spend their summers deep in the woods helping collect data, observe wildlife and plant life, and of course maintain the buildings. The data, collected from equipment, or often observation, is usually sent back to the university where it is then analyzed and explored. The Semester in The Wild is an option for students to spend their semester learning hands-on at the facility. This program drew about twelve students to the TWRS. They did a lot of the same things as summer interns but, were also taking some classes. Faculty sometimes made the trip out and would hold class for the students on site.

Figure 9

Figure 10

Steve Jahelka Interview

Steve Jahelka, an interpreter for California State Parks was willing to share some knowledge about the best ways to inspire younger generations when it comes to the redwoods. Steve has worked in various parks that protect and exhibit some of the tallest trees in the world. Currently, Steve is the main interpreter at Hendy Woods Sate Park (HWSP) and the field trip coordinator for all parks in Mendocino County.

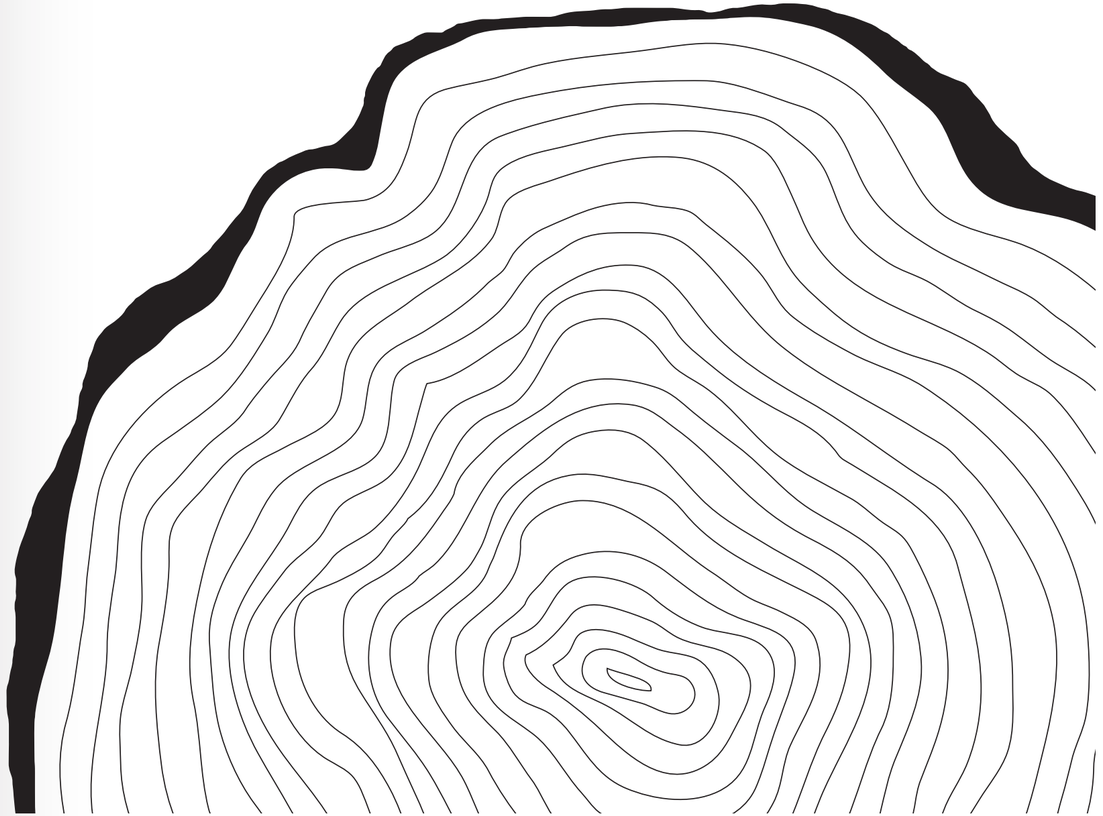
The State parks have settled on a few main ways to engage visitors as they spend time at the parks. One is providing access to trails. HWSP has about 10 miles of trails which are regularly maintained by a trail crew. The park also provides one and a half miles of fully accessible trails. These trails navigate through the two old growth groves that are present on the site, the Big and Little Hendy Groves. These trails allow visitors to get right next to these trees and experience their grandeur firsthand. One of Steve's duties at the park is to lead guided hikes through these trails telling the story of these wonderful trees.

Another thing that HWSP provides to encourage learning are exhibits. These exhibits are meant to be more formal learning experiences but are able to inform people about all kinds of things ranging from stories about the history of the Coast Redwoods, to the incredibly diversity that the trees promote, to conservation tactics and efforts, or even exhibits about the research that is going on nearby. These exhibits area able to provide large quantities of information that can be easily absorbed by anyone at their own pace.

"becoming more and more popular - self-exploration or interactive opportunities"

One more common tactic that seems to be becoming more and more popular, specifically in natural environment education and for younger kids, is self-exploration or interactive opportunities. The idea is that you can tell a curious child over and over that there are all kinds of thing living in the very tops of the tree, three hundred and fifty feet in the air, but that might not mean much to them. But, If there is a model of a tree that they are able to interact with and look for and find some of the slugs, salamanders, mosses, and even trees living and growing in the branches, it is more likely to make an impact. Some ideas for these self-exploration exhibits include representations of the world that exits in the canopies of threes, how big the trees really are, sensors and cameras that would live stream data and video to view, and more. These opportunities provide unique and lasting experiences that really could really impact our perception of the trees and positively impact their future.

Pre-Design



Site Selection: Northern California

For obvious reasons the site for the project would be restricted to the range of the Redwoods, Northern California or Southern Oregon. Although it was my first thought, I decided not to choose a location in the vicinity of the Redwoods National and State Parks near Trinidad, California. This location has some magnificent groves of trees, but it is a very popular tourist destination and is located a little way from large populations. I wanted to spread out learning opportunities and increase the reach of these experiences.

The site is located 20 miles from the ocean, in the midst of the Norther Coast Ranges. The site sits at about 850 feet of elevation. It is located 2hrs 30 mins (130 miles) from San Francisco and 3 hrs (160 miles) from Sacramento. Between these two large population centers there are 1.1 million people close to this site, 4 hours closer than the existing Redwoods Parks.

Figure 11

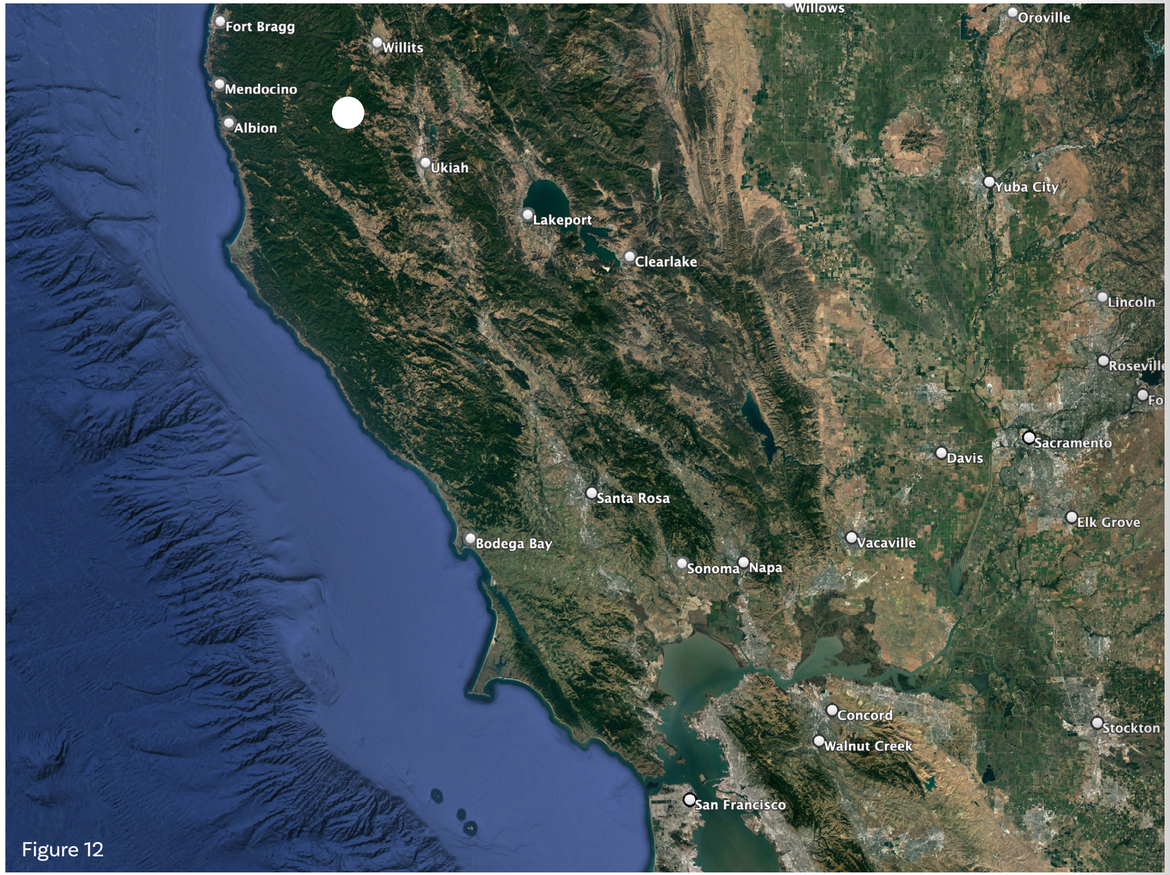


Figure 12

Site Selection: Mendocino County

More specifically, the Site is in Mendocino County. The county is home to 87,000 residents with its county seat located in the town of Ukiah. It is known as one of the best wine regions is California, home to some very popular hot springs, and has a very prominent history of native American tribes.

The town of Mendocino is located on the coast, 1 hr (30 miles) from the site. Ukiah, the largest city in the county, is 30 mins (15miles) away. Other close by notable towns include Willits at 45 mins (35 miles) and Fort Bragg at 1hr 10 mins (40 miles). The popular Highway 101, which runs through Ukiah, is just 30 mins (15 miles) away.

Site Selection: Montgomery Woods State Natural Reserve

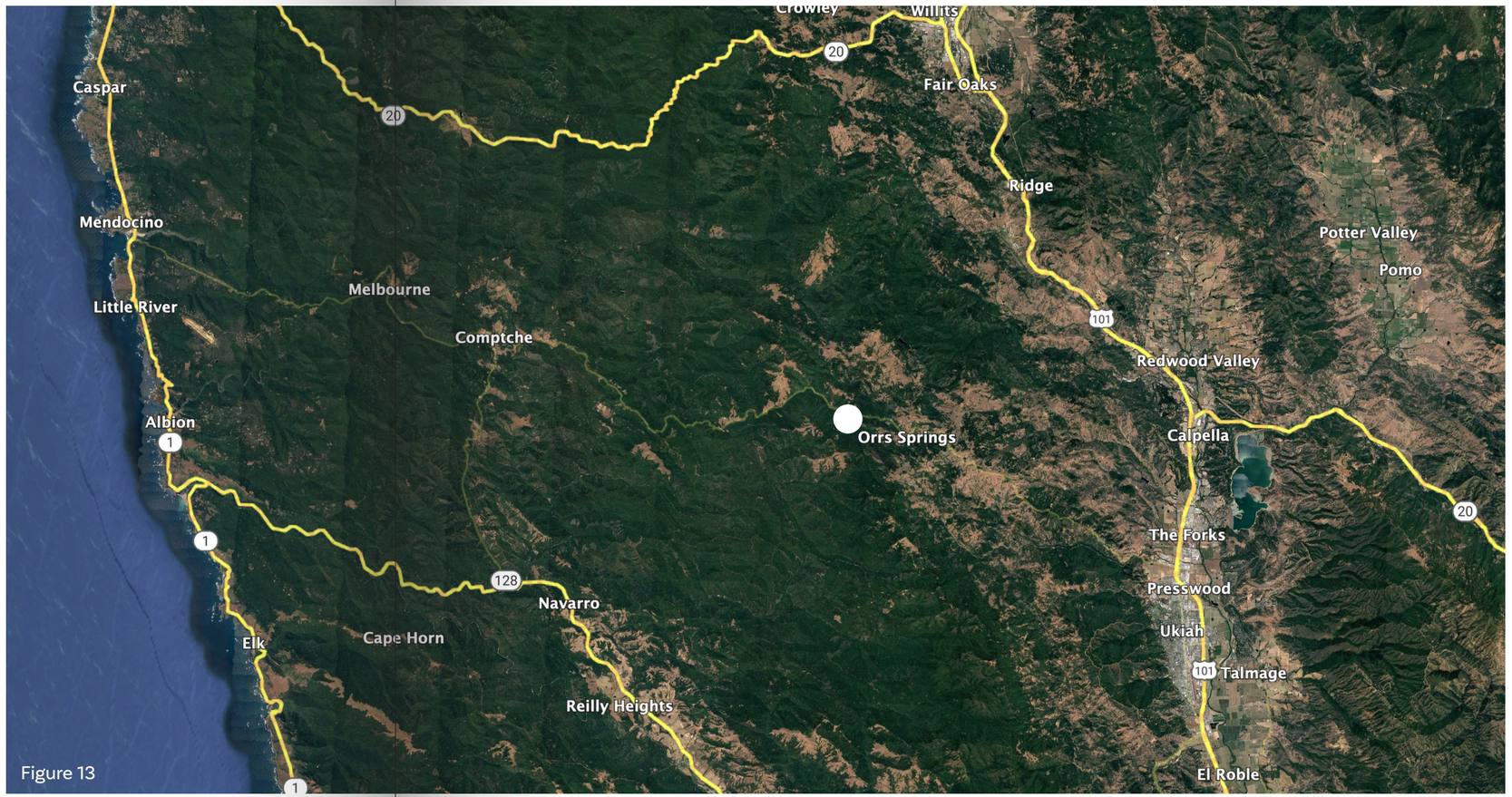


Figure 13

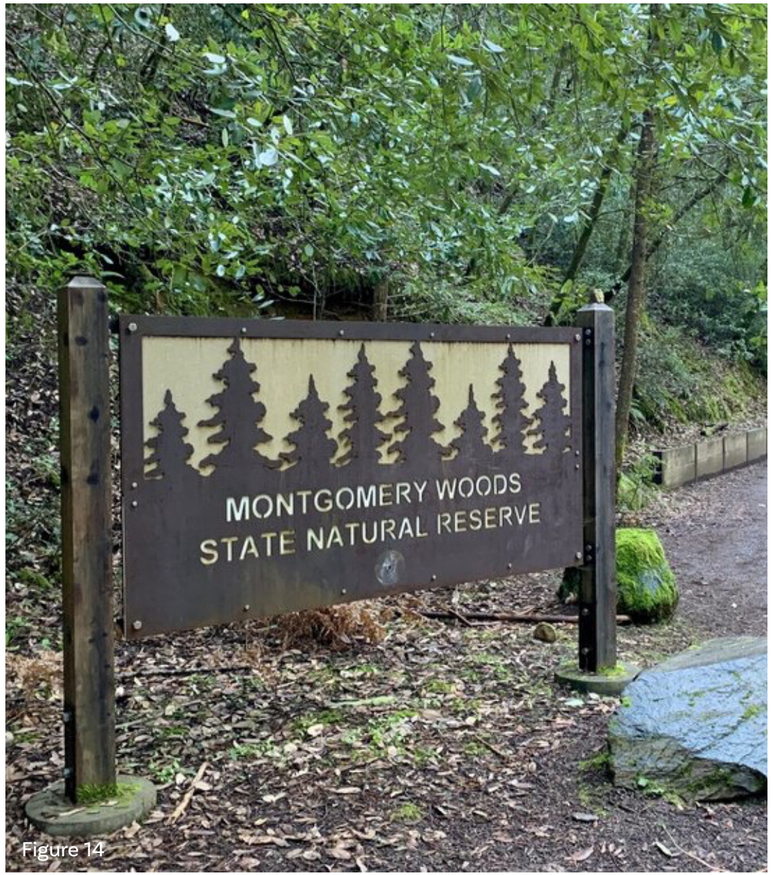


Figure 14

Finally, we land at the Montgomery Woods State Natural Reserve, located just off of Orr Springs Road. This The site is the perfect location for this project for a variety of reason, but even on its own, it is an incredibly beautiful site and contains some of the most impressive Redwoods in the entire state. The reserve protects 2,743 acres of land.

There is some development on the site right now. There is a 2 mile loop trail that start just off of the road. The trail winds along side the Montgomery Creek and passes some amazing trees. A parking lot is at the trail head with room for about 10 vehicles, there is a deck platform with some picnic tables for a quiet lunch, there is a dry toilet, and some informative signs all along the way.

One of the reasons that the land is so great for the purpose of this project is the land around it. The Save the Redwoods League has been working hard to ensure the protection of this land. As recently as fall of 2022 the League has buying and protecting lands to guarantee that their future is out of harms way. Adjacent purchases have included the Weger Ranch (3,862 acres), Atkins Place (453 acres), and Rocky Ridge (80 Acres). Along with the Montgomery Woods State Natural Reserve, this area includes 7,138 acres or beautiful forest. The protection of these properties is all part of a larger effort, what the League is calling the “Montgomery Woods Initiative”. On the Leagues website they call it a “vision to expand protection around Montgomery Woods and improve access to this spectacular old-growth grove.”

Another reason this land serves it purpose so well is that it is the site of some ongoing research. Various researchers representing a few different organizations are helping to understand the effects of climate change on the trees and how they react. Represented are the Department of Forestry, Fire, and Rangeland Management at Cal

“expand protection around Montgomery Woods and improve access to this spectacular old-growth grove.”

Poly Humboldt, the Department of Atmospheric and Climate Science at the Institute for Integrative Biology in Zürich, Switzerland, and the School of Environmental and Forest Science at the University of Washington in Seattle. The research is using 45 trees across the range and 5 of them can be found within the Montgomery Woods State Natural Reserve.

The Weger Ranch, the largest part of the Save the Redwoods League’s recent acquisitions, is also a working forest. This means that the forest and trees are not just protected for their beauty, but for the resources they provide as well. 2,394 acres of the Ranch are under two a Non-Industrial Timber Management Plan. In these areas trees are harvested at a rate that is lower than the growth rate of the forest and each felled tree is individually selected to help promote a diverse forest structure.

So, beyond the incredibly magnificence of the trees on site, there are many more things that make this site perfect. With the efforts from the Save the Redwoods League to establish the area as a destination it has wonderful potential to connect people to the Redwoods. With research going on on the site it serves as a wonderful example of work being done to protect the Redwoods. And with the Working Weger Ranch, there will be ample opportunities to practice quality forest Restoration.

Context Analysis

Understanding all that is going on around the site is vital to the success of a project. It is impossible to create a completely successful project without considering how it will affect the area around it and how the area around it will affect it.

Nature

The area is known for its beautiful natural landscapes. From its incredible old-growth forests to its rugged coastline, secluded coves, and abundant wildlife, there are all kinds of opportunities for interaction with nature.

Agriculture

The area is known for quality organic farming practices. A lot of crops including apples, pears, vegetables, and grapes come out of the area. There are also some large livestock operations in the area.

Wineries

The area is known as one of the best wine growing regions in California. It is in the northern reaches of the quality wine growing regions. There are several wineries within one hour.

Schools

There are 13 different school districts in the area serving all grades through 12th. Between these districts there are almost 80 different public schools accommodating a total of close to 13,000 students. There are a few private/ charter schools in the county as well. Six of the ten largest schools are all in the city of Ukiah. Mendocino College is nearby in the town of Ukiah and has about 4,000 students in attendance.

Demo-graphic Analysis

Knowing and understanding the people who will be using the site is important too.

Population

The Population of Mendocino County is 91,601. This is mostly concentrated in the cities of Ukiah (15,963), Cloverdale (8,854), Fort Bragg (7,279), Lakeport (4,947), and Willits (4,895).

Age

The Median age is 42.2 years. This is about 5 years more than the state of California as a whole and 4 years more that the United States as a whole. The over 18 and under 18 split is off by one percent from state and national numbers but the over 65 range in off by about 6 percent. This is where the age gap comes from.

Language

English in the number one language spoken in households and Spanish is the second. The number correspond very well with national averages. In California though, compared to Mendocino County, many fewer houses speak English and more speak Spanish.

Education

The county sees fairly low education rates as well unfortunately. One in every four people only have a high school education, compared to one in every five in California as a whole. And only one in every ten people have a graduate degree, compared to one in every seven in California as a whole. K-12 Enrollment is good though, five percent higher that the state average and 2 percent higher than the national average.

Employment

The employment rate in Mendocino County for people over the age of 16 is 51.2%. This is a bit lower than the 57.6% employment rate in California and the 58.6% employment rate in the United States.

Climate Analysis

Mendocino County has a mild coastal Mediterranean climate, with cool, wet winters and warm, dry summers. The coastal areas can be quite foggy, especially in the summer months, but the inland areas tend to be sunnier and warmer. Precipitation varies widely depending on location, with the coastal areas receiving more rainfall than the inland areas.

Temperature

The average temperature for the area varies just a little bit throughout the year. Ranging from as low as 46 in December to as high as 75 in July. Maximum highs get up into the 100's though and the lows do make it into the 20's.

Precipitation

The area does receive precipitation mostly in the spring fall and winter months. It does not receive any snow. Rainfall maxes out at 7.5 inches in December and is at about 2 inches in April and October. Between those months though, from May through September, it only rains 1.6 inches.

Degree Days

There are a total of 2,850 heating degree days, 1,056 cooling degree days, and 4,052 growing degree days. There are two months with only one heating degree day. There are four months with zero cooling degree days.

Wind

The area is not particularly windy at all. Average winds range from eight mph in June to two mph in January.

Sunshine

Average hours of sunshine ranges from just under 200 hours a month in January and December to just over 300 hours per month in April, May, June, and July. The sun reaches its maximum height at 74.44 degrees on the summer solstice, and it reaches its lowest height at 27.6 degrees on the winter solstice.

Extreme Weather

Some extreme weather is to be expected as well. Although these things don't occur to often it is vital that they are planned for. It would be detrimental to not consider some of these things.

Drought

Dry or drought conditions have become normal in California in recent years. 100% of California is abnormally dry, 91.8% is in severe drought conditions, and 16.6% is experiencing exceptional drought conditions. Right now, and this hasn't changed for a least a month, all of Mendocino County is affected by severe drought conditions.

Heat Wave

Heat waves are becoming a huge problem for the state of California. These heat waves getting hotter and longer. Just this fall, one heat wave, lasting 10 days, broke 1,000 records. Coupling this with the drought conditions that so much of California is feeling, this creates some serious issues.

Forest Fires

Again, with so much dry land, forest fires are becoming more and more of a problem. In 2021 2.56 million acres burned from 7,396 incidents causing 3 deaths and the loss of 3,800 structures. In 2020 8,648 incidents burned a total of 4.3 million acres killing 33 and destroying 11,116 structures.

Earthquakes

Earthquakes are common in California and will need to be addressed.

Design

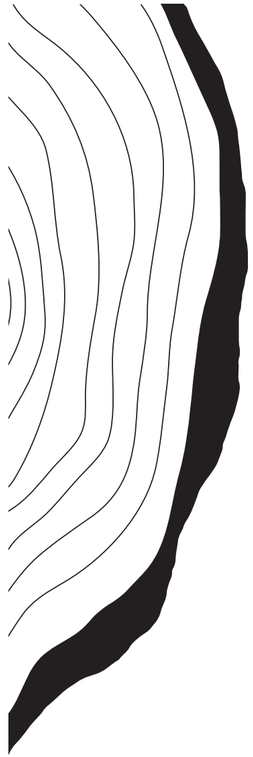


Figure 15

The Montgomery Woods State Natural Reserve

The Montgomery State Natural Reserve is growing. The somewhat developed site is receiving all kinds of new facilities that will greatly impact the lands potential to make an impact on the Redwood groves it contains and the people that live around it.

Many locals will visit the site to learn about the magnificence of their own back yards and the damage that has been done and is being done by their neighbors. Tourists visiting the state will have new experiences to walk amongst and learn about these amazing trees.

Never forgetting about the core ideas, this new and improved destination is sure to make a real difference for visitors. Providing ample opportunities for protection of the trees, for restoration of the forests, and for connection opportunities for visitors.

The new buildings do all that they can to respect the trees and show them off in all of their beauty.

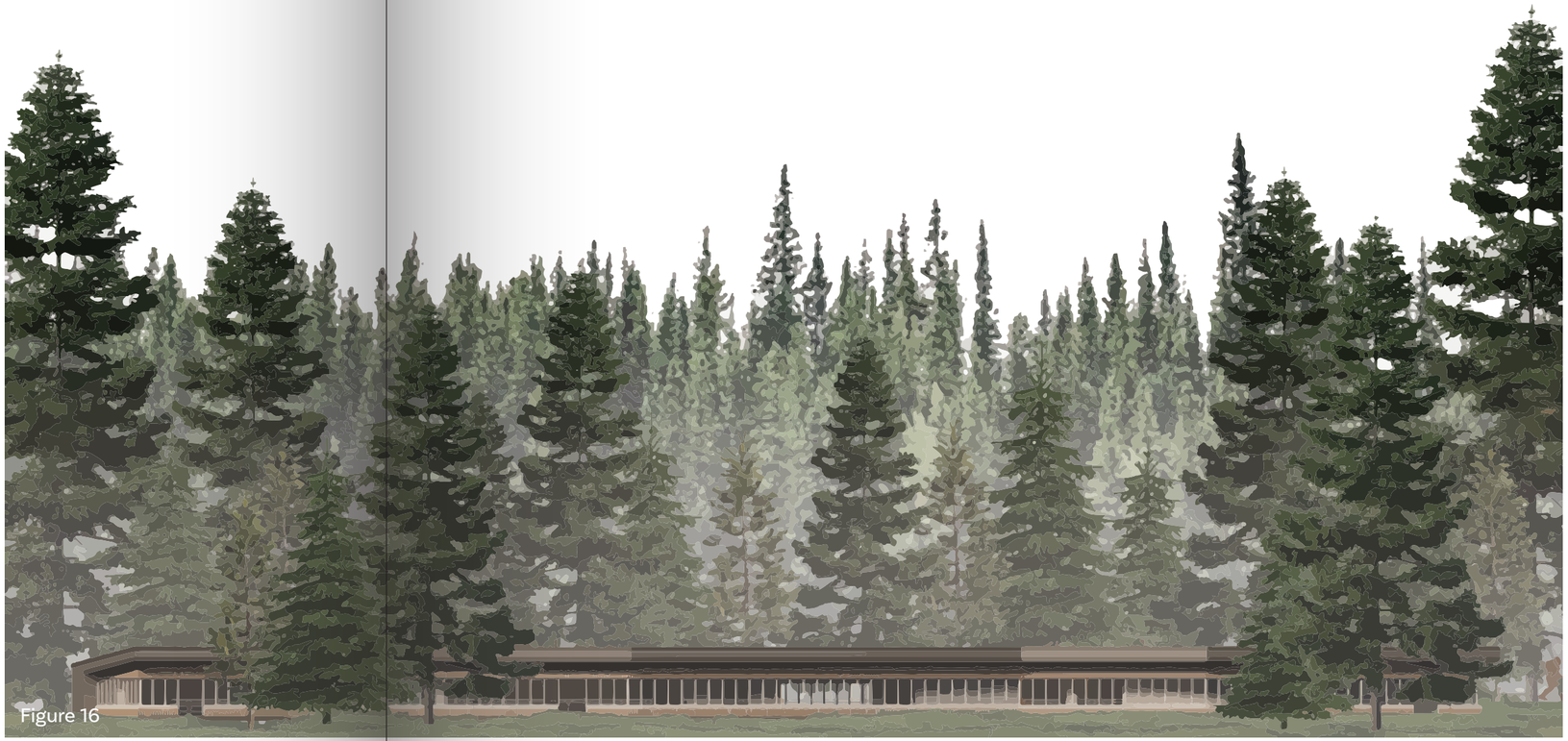


Figure 16

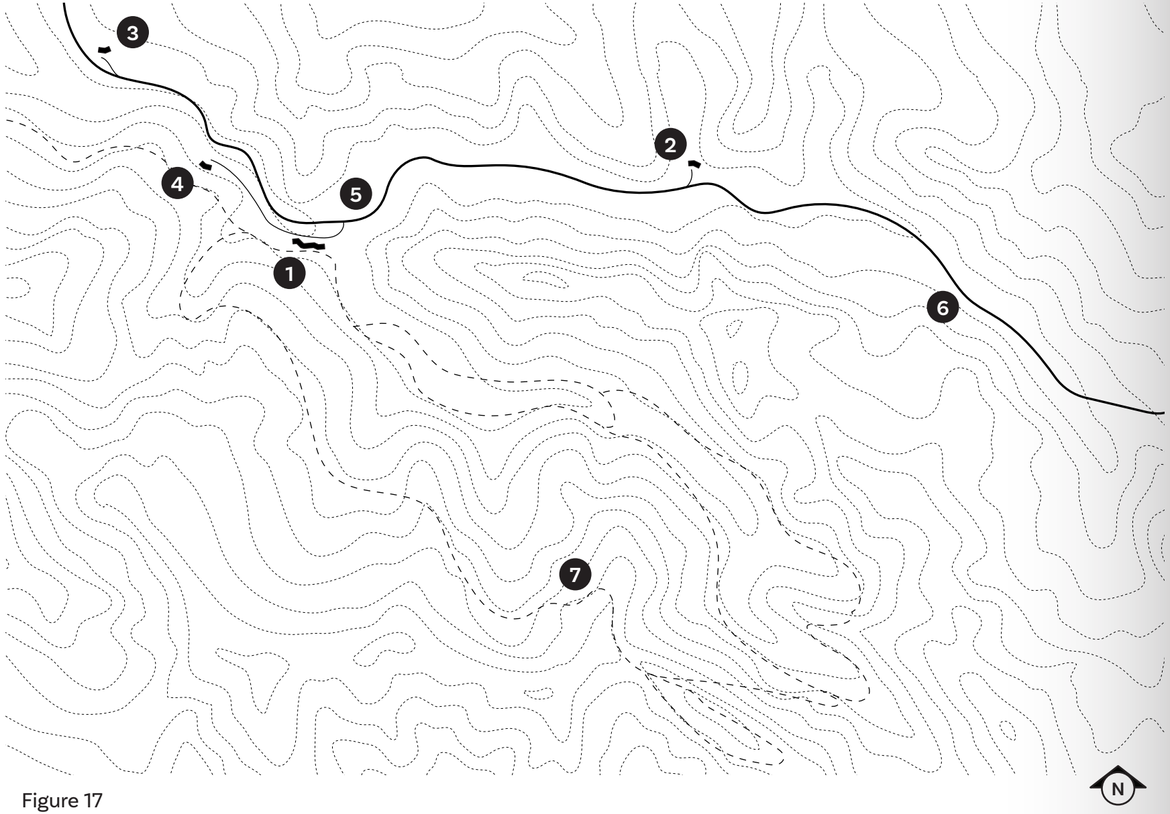


Figure 17

Large Site Plan

MWSNR Visitor Center 1
MWSNR Research Station 2
MWSNR Forestry Station 3
Storage/ Support Building 4
Overflow Parking 5
Orr Springs Road 6
Expansive Trail Network 7

On the site at the new and improved Montgomery Woods State Natural Reserve you can find facilities and amenities that encourage all that the design is trying to promote. Each and every part of the plan plays a role and includes a unique and special experience for anyone who visits it.

The Visitor Center is the place where most people's trip will start. It is a hub for the reserves learning opportunities. People will have all kinds of opportunities to connect to the Redwoods while at this buildings. As the main building on site, more details will be provided later. The Research Station is where some very interesting cutting edge work will be done to help protect the Redwoods. This facility will have resources available for organizations or schools to use as they conduct research on site. The building will include offices, labs, storage, and more. The Forestry Station will be an important building in restoration efforts on site and in the working of the Weger Ranch acquisition. This building will have lots of storage for tools, equipment, and vehicles. There will also be some office space provided for data and information recording and processing.

The Storage/ Support Building will do just that, provide storage for everything from park vehicles to office supplies, all helping to support the other facilities and the site.

The Trails on site were greatly expanded to allow visitors to venture into the sites newly acquired land, to get out into nature, and to be fully immersed and connected to the trees.

All the buildings on the site contribute to the project's missions individually. But when they work together, the possibilities for invoking real interest in visitors climb exponentially. This masterplan sets the foundation for a wholistic experience that will provide each visitor an experience that they will remember forever.

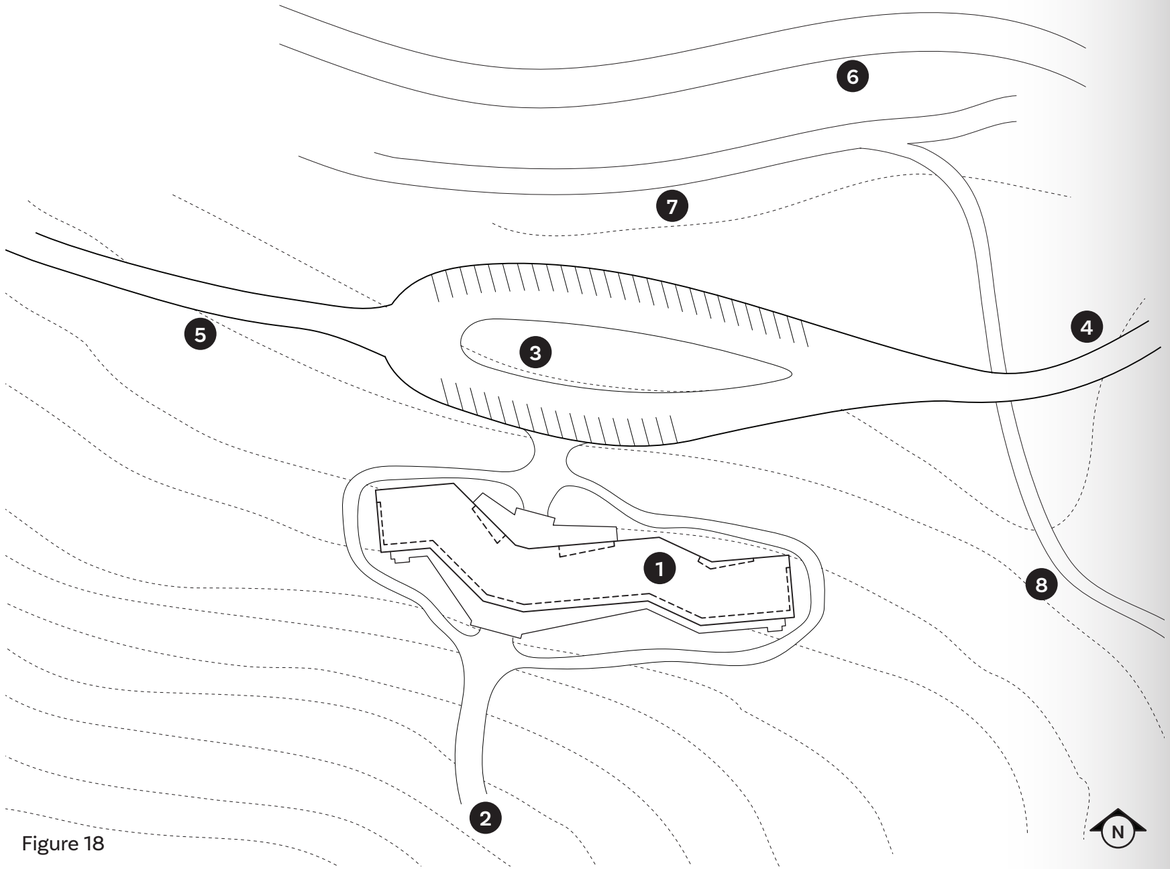


Figure 18

Small Site Plan

MWSNR Visitor Center 1
Path To Trails 2
Parking Lot 3
Driveway To Road 4
Driveway to Storage/ Support Building 5
Orr Springs Road 6
South Fork of the Big River 7
Montgomery Creek 8

As we zoom in on the Montgomery Wood State Natural Reserve, we look at some more specific elements. As the main building on the reserve, this is where the most is going on. This building would be the first experience that people will have when visiting the property.

Just to the south of the building is the trailhead. With access to the original 2 mile Montgomery Grove Trail, and the addition of miles and miles of more trails, the possibilities are endless. A new trail climbs to the top of Rocky Ridge, the highest point on the site, one ventures into the Weger Ranch, and many more trails explore the incredibly beautiful site.

Obviously, there is parking provided. Room for 40 vehicles is located just north of the site, with room for about 20 more located a few hundred feet away on the other side of Orr Springs Road. Bus parking for school trips or other mass transit vehicles is located just a little ways away near the Storage/ Support Building.

Beautifully winding just north of the Visitor Center is the South Fork of the Big River. And just to the east of the building is the Montgomery Creek. These two streams can actually be given credit for creating this amazing grove of trees. Not too often do you find groves with trees this tall so far from the coast because there is usually not enough moisture this far inland. But the two streams provide the trees enough water to grow to their towering heights.

By providing so many attractions on this small part of the site, a visit to just this part of the reserve will provide each visitor with an incredible experience. This part of the facility was designed as the main attraction. Although, it is impossible to discount the importance of visiting the other areas of the site.

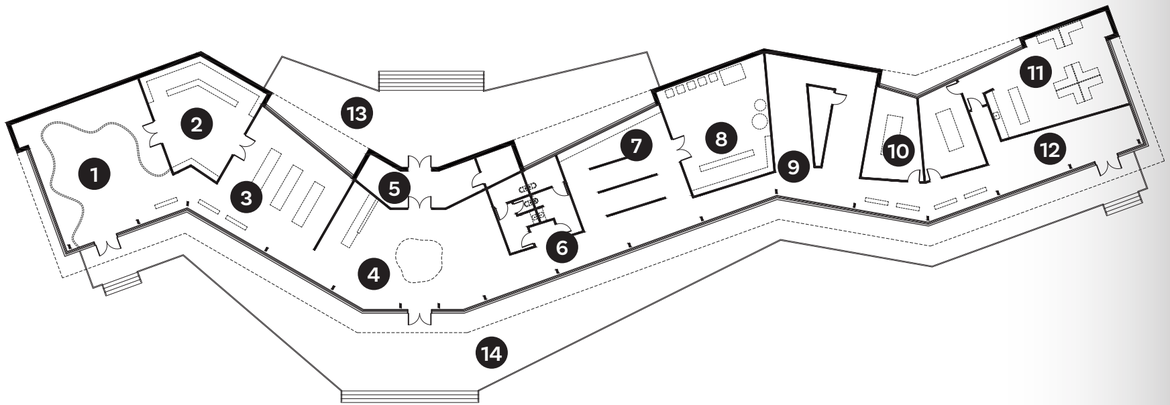


Figure 19

Visitor Center Floor Plan

1. Exhibit (Interpretive)
2. Storage
3. Exhibit (Research/ Forestry)
4. Lobby
5. Vestibule
6. Restrooms
7. Exhibit (History)
8. Mechanical/ Storage
9. Exhibit (Conservation)
10. Meeting/ Classrooms
11. Office/ Break Area
12. Seating Area
13. Front Deck
14. Back Deck

Inside the Visitor Center we can look into all of the things are put in place to ensure an impactful experience for the visitors of the building. The building was designed to be a shell and not much more. Its goal is to simply house exhibits and learning opportunities as well as serve as a controlled place to view the most important exhibit on the site, the Coast Redwoods themselves.

The building includes a Main Entry/ Lobby, four Exhibits that showcase different aspects of the Redwoods, some Office Space for park rangers and staff, a few random seating options, and a handful of random learning opportunities scattered throughout. Of course, there are support spaces to including, some Restrooms, plenty of Storage, and a large Mechanical Room. Surrounding the building on the two long sides are outdoor deck spaces.

One key feature of the floor plan is the south facing, glass lined corridor that runs along the entire length of the Visitor Center. As this path winds along the exhibits the visitor is never allowed to lose sight of the trees just outside. This ensures that people never forget that they are in the midst of the incredible trees they are learning about. The hall provides a lot of light to the interior of the building as well.

The time spent inside during a trip to the Montgomery Woods State Natural Reserve is meant only to provide a base for the time spent outside walking among the trees, giving visitors a background and foundation to help them develop a deep appreciation and understanding of the trees.

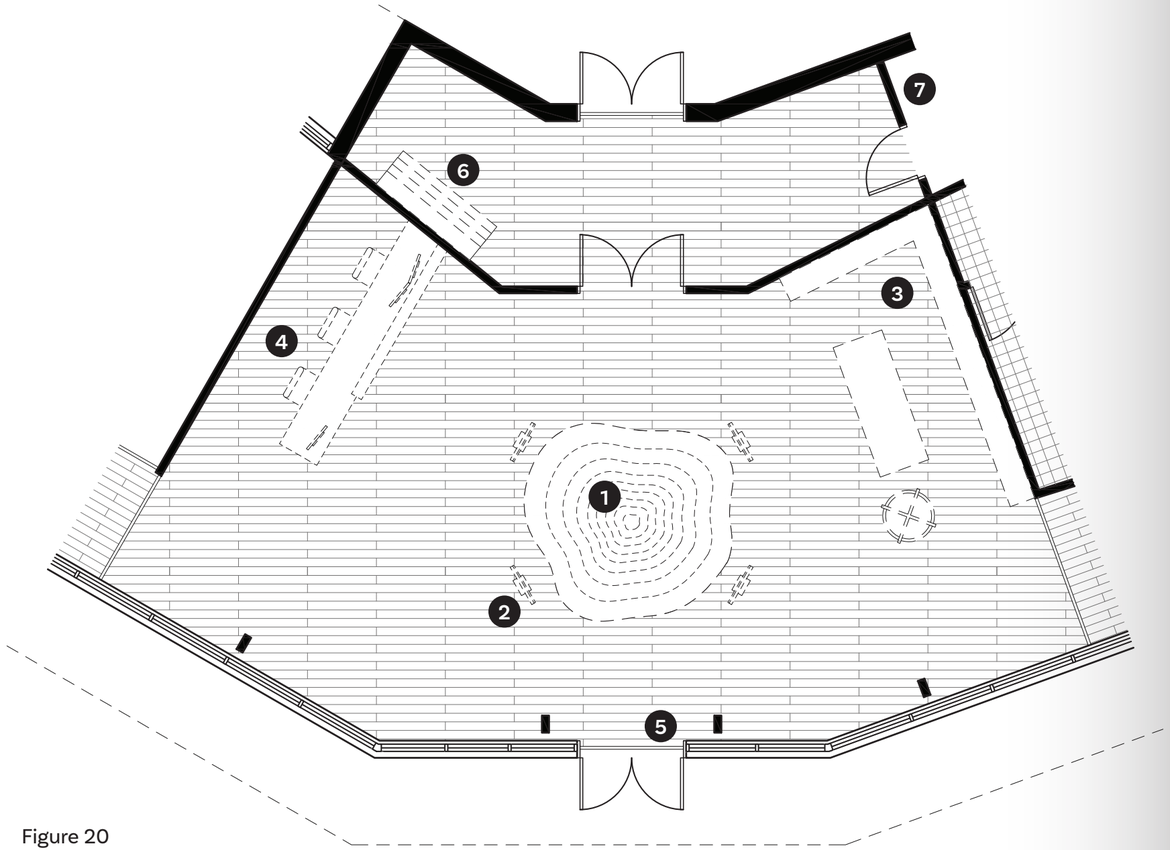


Figure 20

Entry/ Lobby Floor Plan

Montgomery Tree Exhibit 1
Informative Sign 2
Gift Shop 3
Information Desk 4
Doors To Back Patio 5
Brochure Stand 6
Janitors Closet 7

The Lobby at the Montgomery Woods State Natural Reserve Visitor Center creates an immediate and impactful experience for visitor. Showing off all that the center is trying to promote, it has expansive views of the beautiful the trees, a touching exhibit that illustrates the enormity, age, and resilience of the trees, tons of information about the site and its trees, and more. A wonderful place for a visit to start.

When you first enter this space, you would be encouraged, to look outside immediately. After having your view blocked by the building, you will instantly be draw back to the trees that you can see through the glass on the other side of the space. You will have a few options to explore and learn. After spending some time here, you will be encouraged to move onto one of the buildings wings to explore more.

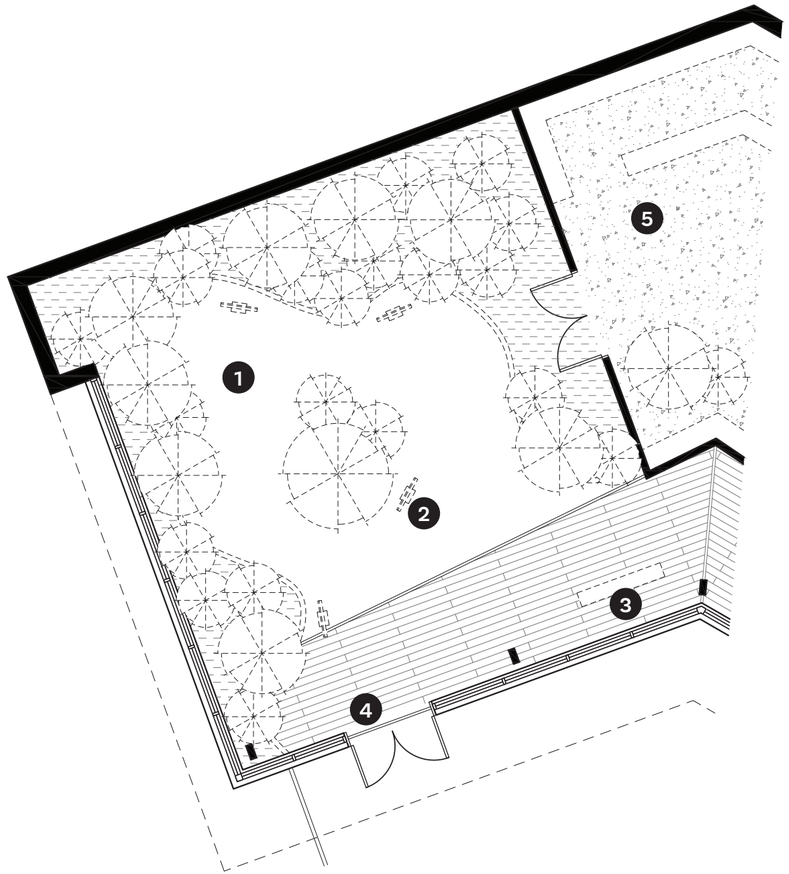


Figure 21

Interpretive Exhibit Floor Plan

Robert Orr Trail 1
Informative Sign 2
Bench Seating 3
Doors to Back Deck 4
Storage Room 5

The Interpretive Exhibit at the Montgomery Woods State Natural Reserve Visitor Center provides a unique learning opportunity for visitors. Targeted towards a younger audience, the Interpretive Exhibit is a scaled old-growth forest. It shows and educates it's viewers about all the tiny details that make up these massive forests. Children are able to walk amongst the trees and see them from a whole new perspective.

This Exhibit will be one of the most fun places to be in the Visitor Center. The Robert Orr Trail is the main attraction here. The trail is named after the donor of the original 6 acres that created the Montgomery State Natural Reserve. The bench seating allows visitors to just take a seat and look out at the trees around them.

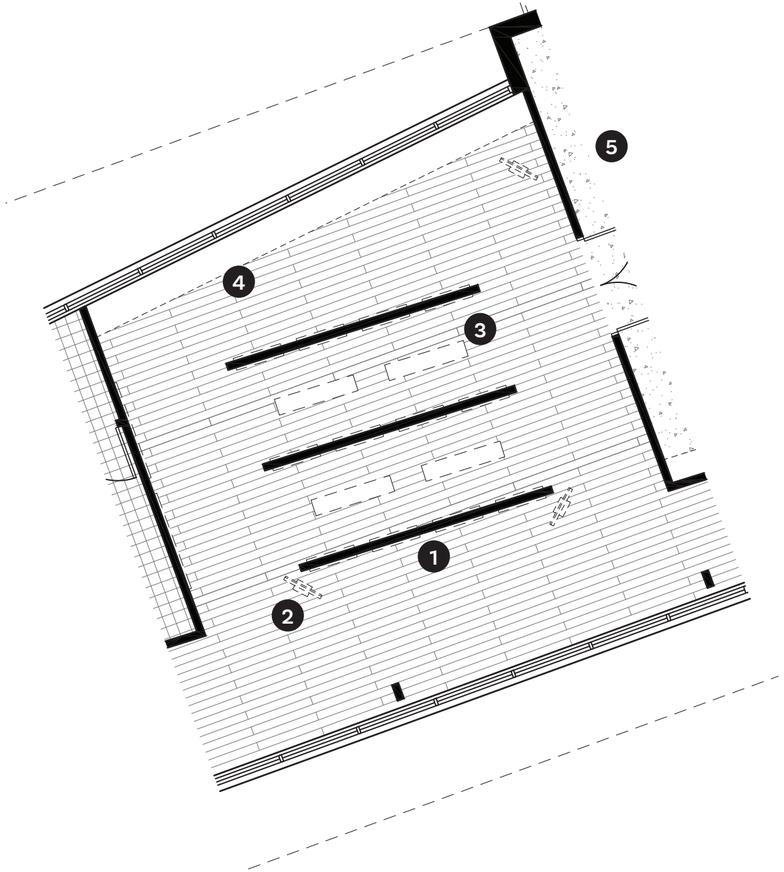


Figure 22

History Exhibit Floor Plan

History Display 1
Informative Sign 2
Bench Seating 3
Historic Artifacts 4
Mechanical/ Storage Room 5

The History Exhibit at the Montgomery Woods State Natural Reserve Visitor Center is one of the five educational exhibits on site. This exhibit provides a holistic understanding of the trees past's, making it easier for us to care about them and ensure their future. From times before white settlers, to the felling of the first redwood, to the extensive logging, and to early conservation efforts, there is a lot to learn.

Along with a Conservation Exhibit and a rotating exhibit that focuses on the exciting work coming out of wither the Research Station of the Forestry Station, these three exhibits are the more information heavy learning opportunities in the building.

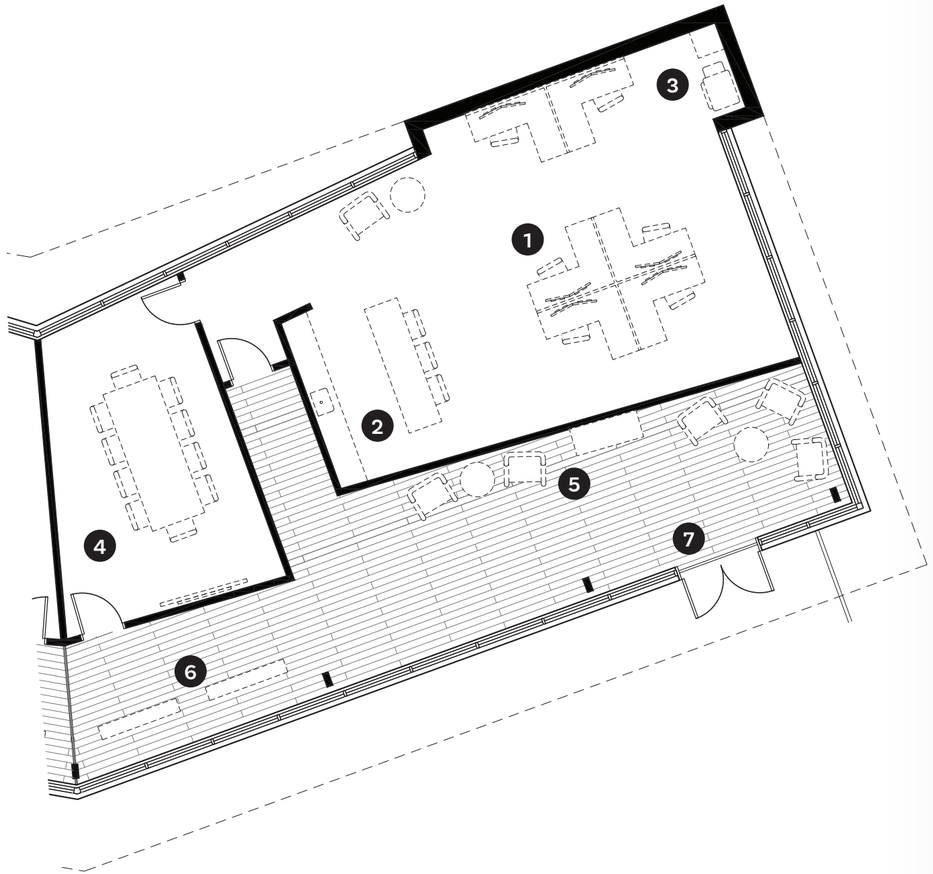


Figure 23

Office Area Floor Plan

Open Office Space 1
Break Kitchen 2
Printer/ Copier 3
Meeting Room 4
Lounge Seating 5
Bench Seating 6
Doors to Back Deck 7

The Office Area at the Montgomery Woods State Natural Reserve Visitor Center is where a lot of the work gets done. It provides resources for the researchers to input data, space for foresters to record information, and a place for park rangers and staff to work. Meeting rooms are also available and can even be used as a classroom space for educational purposes.

Nearby is more seating. More bench seating can be seen here and there is also the lounge area. This is just one more place where people are able to sit down and look outside. One goal is to never let the visitors forget that the trees are the real reason they are there so making sure to encourage as much interaction with them is important.

Design Features

2-D Form

The buildings form in floor Plan is pretty abnormal, but it has a great reason for being so. With the trees health and protection as a priority, a building needed to have as little impact as possible. The plan was originally designed in a straight line. Laying out spaces, adjacencies, circulation, and more, then put aside. After that the forest was mapped. Noting the location of trees, especially the mature trees. After that was done, the two were combined and the floor plan was kinked and bent so that it did not land on any trees. Some of the underbrush would certainly have to be removed, but the larger trees of the site can live on undisturbed.

3-D Form

The form in 3-D is acting on the same principal, getting in the way of the trees as little as possible. The building is a single slope form that opens up to the south. It is a very low profile and subtle building. Sitting low in the forest of giants, it doesn't not impede on its surroundings.

Pile Foundation

Instead of using a common foundation this project takes advantage of pile foundations. These allow the building to sit off the ground and lets plants and animals grow and live under the building as if it weren't there. Is also reduced soil work and as a consequence less disruption to the roots below the surface.

Column and Beam Construction

The Building is held up by a simple and repetitive frame structure. Since the building was first designed in a straight line, there is a wonderful opportunity to simplify the structure to be as efficient as possible. This efficiency allows for some prefabrication and this prefabrication allows for less traffic on site. Less traffic on site is crucial in minimizing the impact of the construction process of the ecosystem.

Mass Timber

The frames for the structure was made from Laminated Verner Lumber. This is because of the environmental benefits that come with this type of construction, but also to create a warm interior atmosphere, one that speaks to and connects users to the trees around them. The beams used on the exterior of the building would be treated with eco-friendly fire proofing.

Materials

The building was designed with materials that would blend into the environment and to help protect the building from fire. Covering most of the building with metal will help mitigate a lot of the fire worry. Some wood was use to help the building fit into the site, but it would be fire protected, just like the beams under the building.

Natural Lighting

The windows on the south side of the building would do a great job at providing the building with ample natural light. The windows are 8 feet tall, about one quarter the depth of the building. The forest is so dense that not a lot of direct light would make it down, so overheating should be a problem.

Water Collection

The single sloped roof provided a wonderful water opportunity. Water runs to the north side of the building and is channeled into some water tanks. The water then supplements the buildings water use but has another use too. Some of the water collected is redistributed underneath the building, ensuring that the soil is completely saturated even if there is a building directly above it.

And although not developed as far, the Research Station, the Forestry Station, and the Storage/ Support Buildings all follow the same exact principals.

Exterior Render

Figure 24

Figure 25

Interior Render

Figure 26

Presentation Board

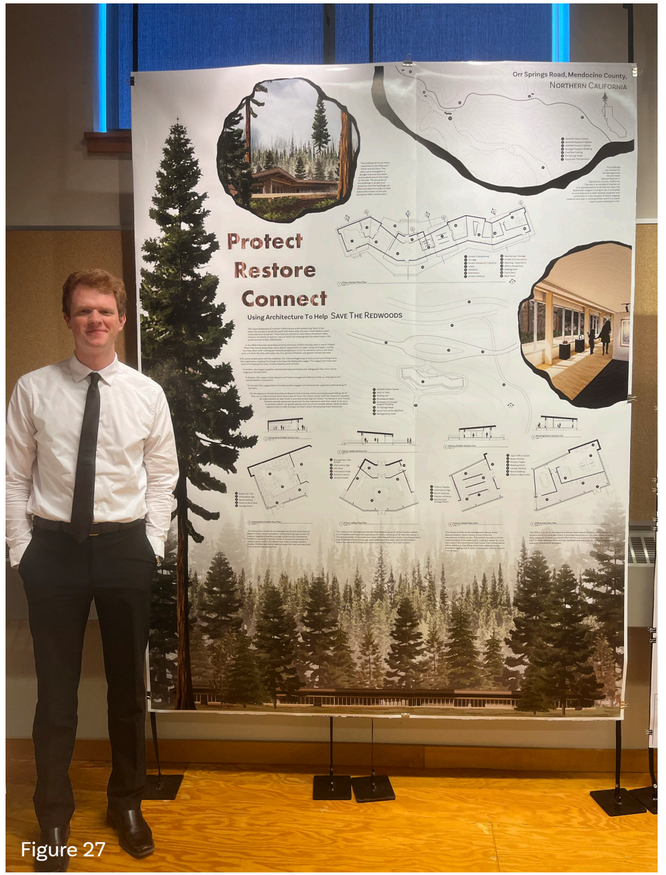


Figure 27

Previous Design Studio Experience

Second Year

Fall Semester - Charlotte Grueb
- Artist Dwelling
- Minneapolis Boathouse

Spring Semester - Milt Yergens
- Cripple Creek Home
- Birdhouse
- Yergens Hall

Third Year

Fall Semester - Bakr Aly Ahmed
- NDSU School of Design
- Miyun Resort Residences

Spring Semester - Niloufar Aljengery
- New Bauhaus
- Fargo Moorhead Greenway

Fourth Year

Fall Semester - Mark Barnhouse
- The Dec Highrise

Spring Semester - Paul Gleye
- Marvin House
- ReVision Moorhead

Graduate Year

Fall Semester - Cindy Urness
- Ott Jacob Wetlands
- Thesis Research

Spring Semester - Cindy Urness
- Protect Restore Connect