Senior Project Paper

The following paper is a documentation of my one-year exploration into wilderness survival for my Senior Project at Summerfield Waldorf School and Farm.

STARTING GOAL: The starting goal of my Senior Project was to learn all the skills necessary to survive in the wilderness, and then to implement these into a survival trip which would last as long as I deemed possible. The many skills necessary for me to learn so that I could accomplish this goal included building a warm and waterproof shelter, finding and purifying water, making a fire, locating and processing foods, making tools, and gaining deep respect and awareness for Nature, a skill that would ultimately be the deciding factor in the success of my Senior Project.

RESEARCH: My first step in my Senior Project was to conduct an immense amount of research on my topic. This research really started in 11th grade at Summerfield, most prominently in our I-Search class. For my research, I looked at all the ways that the Pomo Indians of the Sonoma County, California area were able to survive in the wild. My thought was that once I had this information, I could try to replicate their techniques and thus learn how to survive in the wilderness. Below is all the research that I was able to come up with on the Pomo Indians' way of survival and life.

The results of my research can be put into the following six main survival categories of the Pomo: Shelter, Water, Fire, Food, Tools/Crafts, and Respect/Awareness. These were all extremely crucial survival techniques employed by the Pomo, allowing them to live in harmony with the land for thousands of years.

1. Shelter: The Pomo used several different shelter techniques and styles. Their first step was choosing the location, something they took very seriously. They looked for an area near water, but not too close, as a surprise rainstorm could flood them out if this were the case. The location was based on other factors as well, including the presence of an adequate food source, and protection from the weather. The shelter was most often placed so that the entrance faced the east, catching the morning sun but away from the prevailing winds (Campbell 30).

1.1 Brush House: The most common shelter employed by the Pomo was the brush house. This was made by bending willow poles towards each other in the form of a circle or oval. This framework was then covered in brush, grass, tule, or other foliage. This shelter was made in varying sizes, the largest of which could fit several families. This type of shelter was used most often by the Pomo of the hills and valleys (Andrews 31).

1.2 Redwood Bark Tepee: Another shelter commonly used by the Pomo was the redwood bark tepee. This was made with an underlying framework of willow, onto which redwood bark slabs were placed. The shelter was completely sealed with this bark, except for a small opening at the top for smoke, and a small entrance at the bottom. This shelter was most commonly used by the Pomo of the coast, as this was where redwood trees were most abundant (Andrews 31).

1.3 Summer Homes: All of the shelters described thus far were for use during only the rainy season. The Pomo used a more temporary lean-to or brush shelter during the warmer months (Andrews 31).

1.4 Debris Shelter: During trips away from their villages, and in cold weather, the Pomo would most likely have made a debris shelter. This was made by lifting a sturdy ridgepole made from a

straight branch a bit longer than the length of a person onto a stump or rock about two feet off the ground. Then, branches were set on both sides of the ridgepole, so as to form a tapering triangle. Next, the whole shelter was covered in a two-foot thick layer of leaves, grass, or duff. This layer was made even thicker for extremely cold or wet weather. Finally, as the person crawled inside of the shelter, they stuffed it with more leaves, grass, or duff. A pile of this material was pulled in after the person to act as a plug for the entrance. This shelter was easy to make and could keep out the cold and wet surprisingly well (Brown 30).

2. Water: The Pomo found water in springs, creeks, rivers, and lakes. They recognized the presence of water in the landscape by looking for plants, most commonly trees, which tended to live near water. These included willow, cottonwood, and alder. The Pomo also used the terrain to guide them towards water sources. For example, knowing that water flows downhill, they would search for it in depressions, valleys, and basins. In very dry areas, the Pomo may have used the following technique: Using a clump of grass or moss, they would collect the morning dew. Then, the grass or moss, acting as a sponge, could be rung out and the water collected. Another technique employed in dry conditions may have been to use the water collected by plants. Excellent plants for this purpose included grapevines and thistles. The stems were broken and the liquid from them gathered. Overall, the Pomo valued greatly the importance of water. They even considered water to be the blood of the Earth, recognizing that life on Earth relied on water to exist (Brown 47).

3. Fire: The Pomo recognized fire for its importance in their lives and were always thankful for its presence. The Pomo made fire with the hand drill. This fire-starting technique used a spindle, a fireboard, and a tinder. The spindle was most commonly made from the wood of a buckeye, willow, or another hard-wooded tree. Some plants with stiff stems were also used, such as cattail or elderberry. The fireboard was made from similar materials, although a slightly harder wood than that of the drill worked as well. The tinder most commonly used came from the inner bark of a cottonwood tree, the pith of elderberry, or certain dried fungi. Cattail down also worked well, along with dried bracken fern and mugwort (A Fire Friction Inquiry).

To start a fire, a notch was carved into the fireboard. The notch was made so that it was about as long as the width of the spindle. Then, a hole was carved where the notch ended on the fireboard. The spindle was spun rapidly between the hands with downward pressure directed into the hole. The drill caused hot wood dust to be directed out of the notch. As the heat from the drill intensified, the wood dust eventually ignited in the form of a coal. This coal was then placed in a ready bundle of tinder, where it was blown into flame. This burning tinder bundle was then covered in sticks, and as the fire strengthened, larger branches (A Fire Friction Inquiry).

4. Food: The Pomo utilized many plants and animals for food. Plants included a variety of nuts, greens, roots, berries, seeds, and seaweeds. Any animal with fins, fur, scales, or feathers was considered edible by the Pomo. Insects were also eaten, although some species were poisonous, and thus avoided (Bliss-Wagner).

4.1 Nuts: The main trees used for food by the Pomo included the oak, hazel, pine, buckeye, walnut, and bay. The nuts of these trees were collected in the fall, generally, after they had fallen

from the tree. The nuts of the oak and buckeye needed to be processed and cured, while those of the walnut, hazel, and pine could be eaten raw or roasted. The nuts of the bay tree were dried and roasted by the Pomo (Andrews 15).

The curing process for acorns was relatively simple, although it was a bit time-consuming. The acorns were dried and shelled, after which they were ground into meal. The next step in the process was to leach the acorn meal. The meal was placed in a carefully prepared sand basin, onto which water was lightly poured. Water was continuously allowed to run through the acorn meal until the meal had lost its bitter taste. The prepared meal was then made into soup or bread (Campbell 87).

The curing process of the buckeye nut was very similar to that of the acorn. The only difference was that the process took up to eighteen hours to complete. The buckeye meal was also most often eaten without cooking (Campbell 88).

4.2 Greens, Bulbs, and Corms: Greens, bulbs, and corms the Pomo most commonly used included cattail, clover, miner's lettuce, thistle, wild onion, plantain, and various species of brodiaea and camas. The leaves of the clover, miner's lettuce, and plantain were generally eaten raw but sometimes the older leaves of the plantain were boiled. The spines on the thistle were removed and the stems and leaves eaten either raw or boiled, depending on the age of the plant (Campbell 136-145).

The bulbs of the wild onion were most often eaten raw but sometimes were baked as well. Additionally, various species of brodiaea and camas were valued for their nutritious corms. These corms were dug up from the base of the plant and eaten either raw or cooked (Campbell 136-145).

Cattails were probably one of the most important plants used by the Pomo. There was always some edible part of it for any given time of the year. During the spring, the new shoots up to two feet tall were eaten raw or boiled. A bit later in the spring, the flowerheads were eaten after being husked and boiled. Also present during this time of year was the pollen of the cattail. This pollen could be collected and used as flour. Throughout the summer, fall, and winter, the root of the cattail was dug up and ground into flour. Lastly, the small sprouts on the roots were collected anytime from summer through winter and eaten raw or boiled (Brown 84).

4.3 Berries: The Pomo also utilized many types of berries as a food source. The berries of the blackberry, serviceberry, gooseberry, salmonberry, salal, raspberry, thimbleberry, strawberry, and huckleberry were eaten raw. Manzanita berries were dried and ground into a meal, which was made into cakes and eaten. Cider was also made using manzanita berries. The berries of the madrone were dried and roasted for winter storage, or simply eaten raw (Campbell 149).

4.4 Seeds: Seeds were also gathered by the Pomo. The plants these seeds were collected from included primrose, tarweed, chia, plantain, mule ears, oat, pond lily, rye, and buttercup. The seeds were beaten off the plant into a basket and roasted over the fire. They were also ground into flour (Campbell 162).

4.5 Seaweed: Seaweed was also collected and eaten by the Pomo. Many types of seaweed were used, including bull kelp, sea palm, and sea lettuce. The seaweed was eaten raw or baked (Andrews 16).

4.6 Animals: The most common mammals eaten by the Pomo included elk, deer, seals, rabbits, squirrels, and wood rats. Many birds were also eaten, including quail, pigeons, doves, ducks, and geese. Reptiles such as turtles, and less commonly snakes and lizards were also eaten. Fish were

a very important food source for the Pomo. Freshwater fish species eaten included salmon, steelhead, and trout. Ocean fish included perch and rockfish. Grasshoppers, gnats, and caterpillars were the most common insect species eaten (Andrews 18-22).

Mammals were skinned, gutted, and then roasted over a fire. Birds were plucked, gutted, and cooked in the same way. Reptiles were prepared in a similar fashion to mammals, while fish were simply gutted and roasted. The Pomo collected insects and roasted them over the fire, or made them into a soup. A technique used to catch and cook grasshoppers entailed burning a field where grasshoppers had been detected, and then picking out the perfectly roasted grasshoppers and eating them (Brown 228).

5. Tools and Crafts: Tools and crafts were an everyday necessity to the Pomo. The Pomo relied on these skills to complete all of the survival categories discussed thus far.

5.05 Cordage: One of the most important of these skills was the ability to make cordage. Cordage was made with a variety of plant materials, most commonly the inner bark of dogbane, primrose, stinging nettle, and milkweed. The inner bark of trees worked as well, with walnut, aspen, cottonwood, and maple being the best. Another plant that was highly valued for the cordage material it supplied was the bowl-tubed iris. The leaves of this plant were collected, and two incredibly strong fibers were taken from each leaf (Brown 241).

Cordage was made by collecting the fibers from a plant and then rolling and twisting the fibers into usable string or rope. The process used to do this was relatively simple. First, the Pomo would take a cluster of the fibers and fold or kink them in the middle. Then, on their bare legs, the fiber was laid so that the two strands lay next to each other. The fibers on their legs

were then twisted by rolling a hand over them. Lastly, the kinked end was released, and the two fibers were allowed to twist upon each other. This process was repeated, and more fibers spliced in when necessary. Using this method, the Pomo could make cordage in nearly any length, strength, or thickness (Campbell 48).

Another type of cordage used by the Pomo was the sinew from an animal such as a deer. Sinew, in fact, was the strongest cordage material known to the Pomo. As noted by Tom Brown, in his book *Wilderness Survival,* "A strand as thick as a carpet thread will hold the weight of an average man" (242). Sinew was taken from the backbone, or from tendons and ligaments connecting the muscles of the animal. It was then pounded with a smooth rock to separate the fibers and put in hot water to soften. One of the most useful properties of sinew was that when wetted with saliva and let to dry, it shrank and hardened like glue (Brown 242).

5.10 Glue: The Pomo used glue for many things including fastening stone tools to handles and shafts. The Pomo made glue from the sap or resin of a pine tree. The sap was collected and then melted in a container. When it was liquid, charcoal was added. About one part charcoal was added to two parts sap. This mixture was then globbed onto the end of a stick for storage. Whenever needed, the substance on the stick could be warmed until soft and used as glue (Brown 263).

5.15 Coal Burning: The Pomo used a technique called coal-burning to fashion wooden bowls and containers. To make a wooden bowl, the Pomo first started a fire. Once the fire had a significant amount of coals, they placed a coal from the fire onto the piece of wood they were planning on making into the bowl. Next, using a hollow piece of grass to direct their breath, the Pomo would blow on the coal. Soon, the coal would begin to spread onto the piece of wood. As

the coal burned on the wood, it slowly hollowed out a depression in it. After the depression was the necessary depth, the charcoal was scraped out with a stone scraper. The result was a bowl or container. Using this method, the Pomo could make a bowl of nearly any size (Brown 253).

5.20 Bone Tools: Tools made from bone were useful in that they required little work to make and were easily sharpened. Bone tools were made by scoring the bone with a sharp rock and breaking them with a rock. The bone tended to break along the pattern scored on it. These pieces of bone could then be sharpened on a piece of sandstone. Common tools made from bone included awls and needles (Brown 251).

5.25 Stone Tools: Another highly important skill the Pomo relied on was the production of stone tools. This skill included flint knapping sharp blades such as knives, scrapers, spear points, and arrowheads, along with pecking duller hammers, grinding stones, mortars, and pestles.

The stone necessary for flint knapping had to break with a conchoidal fracture, much like glass. Stones used by the Pomo for this purpose included obsidian, chert, chalcedony, and basalt. To knap a stone tool, a Pomo first needed several tools, including a pointed piece of deer antler or very hard piece of wood, a strip of leather, and a small and large round hammerstone. To make a blade, the Pomo would first break off a flake from a large piece of suitable stone with the large hammerstone. Then, covering the base of their non-dominant hand with the strip of leather, they grasped the flake tightly between their palm and fingers. The strip of leather acted as a protection against the razor-sharp flake in their hand. Next, the Pomo took the small hammerstone and knocked off large thinning flakes. They accomplished this by striking the flake in their hand at a slightly less than a 90-degree angle to the edge. This process thinned the flake considerably. Once the blade was the desired thickness, the Pomo would then use the deer antler

to push off smaller, more accurate flakes from the edge. The Pomo did this by pointing the tip of the deer antler at a slightly less than a 90-degree angle to the edge, and pushing against the edge with pressure until a flake broke off. This technique is known as pressure flaking. Using these two methods, the Pomo could make a very sharp blade that could be used for scraping, cutting, or sawing ("Making Arrowheads").

The stones used by the Pomo for pecking tools included basalt, sandstone, and any other coarse-grained rock. A pecking tool was basically a hard, hand-sized rock which was used to make a depression into a softer rock. To make a hammer, grinding stone, or mortar and pestle, the Pomo first found a round rock which was considerably harder than the rock they planned on using to make the tool. Then, with repeated blows, they were able to slowly knock off small grains of the softer rock, allowing them to form it into the desired shape (Brown 248).

5.30 Hafting Hammers, Scrapers, and the Points of Knives and Spears: The Pomo used a variety of sharp bladed stone tools in everyday life. Most of these tools needed a handle or shaft to be fastened onto, such as a piece of wood or bone. This process is known as hafting.

The hammerstone was generally oval in shape. To haft a hammerstone onto a handle, a groove was pecked around the middle of the stone. Then, a piece of green wood was bent around the groove. The ends of the wood were joined together and wrapped with sinew or cordage all the way up the handle. Once the wrapping was to the hammerstone, the stone was tightly secured with multiple diagonal lashings (Brown 249).

The scraper was flint knapped in nearly any form, although a half-moon shape was the most common. Scrapers were generally not hafted at all, although some were wrapped to a stick

with sinew or another cordage. The stick was generally about as long as the scraper, and wide enough to fit comfortably in the hand (Campbell 329).

Knife points were most commonly flint knapped in a willow leaf shape. The hafting process for knives was overall relatively simple. A groove was first filed into one of the ends of a stout stick. This groove was generally about as long as half the length of the knifepoint to be hafted. Then, a small amount of glue was put in the groove. The knifepoint was then inserted into the groove and wrapped tightly with sinew or another cordage. Knives could be used for many purposes, including skinning animals and cutting meat, roots, or shoots. Spear points were hafted in the same way as knives (Campbell 331).

5.35 Spear, Atlatl, and Bow and Arrow: The following weapons were crucial to the survival of the Pomo. The Pomo used the atlatl and spear throughout their history, while the bow and arrow were used only in the last thousand years.

The spear was used primarily for close-range hunting. This was because the spear could only be thrown accurately for short distances. The spear shaft was generally made from a five to six-foot-long piece of straight wood, such as willow. At the end of the shaft, a groove was filed and a stone or bone spear point fastened in the same way as a knife. The spear point was generally made in a triangle shape, with notches knapped into the two bottom corners (Brown 223).

The atlatl was the most important weapon to the Pomo before the bow and arrow. It could throw an atlatl dart much farther than what could be done by hand. The atlatl was made from a branch roughly two feet long and a couple of inches wide. On one end of this branch, a small protruding wooden point was attached. This point was made to fit into the end of the atlatl dart.

The other end of the branch was used as a handle. The atlatl dart was made much like a spear, except much smaller, roughly three feet in length. On the end opposite the point, feather fletching was tied on for stability in flight. To do this, the Pomo split a feather lengthwise. Then the Pomo, after acquiring three half feathers, each about four inches long, tied them onto the atlatl dart. The fletchings were evenly spaced around the end of the dart and tied on with sinew or another cordage. Lastly, a notch was filed at the end of the dart. This notch was made to fit the protruding point on the atlatl. To throw an atlatl dart, the Pomo put the end of the dart into the protruding point on the atlatl. Then, holding the handle end of the atlatl in their hand and pointing the other end of the atlatl away from their body and parallel to their arm, the Pomo swung the handle forward and down. The dart flew off the protruding point and into (ideally) whatever the Pomo was aiming at (Campbell 307-311).

The bow and arrow was a very important key to the survival of the Pomo Indians of California. This weapon allowed the Pomo to more easily hunt deer and other large mammals, as it had much more range than that of an atlatl or spear.

The Pomo bow was most often made of bay or willow. The branch chosen for this purpose had to be straight, strong, and resilient. Ideally, it would have no weak points such as knots or branches. The bark on this branch was then peeled, and the branch set to cure for a couple of days. Once the branch had cured sufficiently, the natural bend of the wood was determined. In making the bow, the Pomo made sure that the finished bow would bend in the opposite way. Next, the bow was shaped. This was done with a knife or scraper. The bow was shaped so that it tapered on both ends. After this shaping process was complete, the Pomo let the bow cure for another few days. When the bow was finished curing, it was gently heated by a fire

and rubbed with animal fat. This process was completed after several days. The last step in the making of the Pomo bow was to make a string for it. The string was usually made from sinew and was wrapped onto the ends of the bow. The sinew string was tightened and the bow was finished (Brown 218).

The Pomo most often made arrows from hazelnut or willow shoots. To make a solid shaft arrow, the Pomo found a shoot roughly two to three feet long with no knots or branches. This shoot was ideally about a quarter-inch in diameter. The Pomo peeled off the bark on the shoot and left it to cure for about a day. Then, the shoot was straightened by gently heating it. Once the shoot was warm, it was bent and held in this position until the shoot had cooled. This process was repeated until the shoot was perfectly straight. The next step in the process was to haft an arrowhead onto the thinner end of the shaft. The arrowhead was made in a triangle shape with notches on the two bottom corners. It was generally a half to two inches long. This arrowhead was hafted to the shaft in the same way as the atlatl dart or spear. The last step in the making of an arrow was to fletch and notch it. This again was done in the same way as the atlatl dart. The ideal balancing point of an arrow shaft was slightly forward of the middle. This allowed the arrow to fly straight and with maximum velocity (Brown 219-222).

The Pomo also made another type of arrow which was slightly more time consuming to make but was also more efficient in many ways when finished. The main difference in this arrow compared to the other was that there were two separate detachable parts; the mainshaft and the foreshaft. The mainshaft started at the tail end of the arrow, included the nock and feather fletching, and was about one and a half to two and a half feet in length. At the front end of the mainshaft, a hole was drilled vertically up into the wood. To drill this hole, the Pomo placed a

pointed piece of bone at their feet and pushing downwards, implemented much the same techniques as the hand drill by spinning the mainshaft onto the sharp piece of bone. The foreshaft was made out of similar wood, although generally slightly harder. The Pomo made the foreshaft anywhere from half a foot to a foot in length. On the front end of the foreshaft, an arrowhead was secured in the same way as on the solid shaft arrows. On the tail end of the foreshaft, the Pomo carved it into a point so that it fit snugly into the hole drilled into the mainshaft. Thus, the foreshaft and the mainshaft could be fit together and then taken apart. The advantages of this were many. With this design, the Pomo could make multiple foreshafts, each designed for a specific animal, for each mainshaft. Also, if an arrow point or foreshaft shattered on impact, instead of having to make a whole new arrow, the Pomo only had to make a new foreshaft. This is just another example of the incredible wisdom of the Pomo (Brown 219-222).

5.40 Traps: Traps allowed the Pomo Indians of California to hunt animals while at the same time doing other tasks. This was obviously very useful to them. There were three main types or styles of traps used by the Pomo. These were the deadfall trap, the snare, and the fish trap.

The deadfall trap was most commonly used to catch rodents, although it could be used on animals up to the size of a coyote. The deadfall trap was made in a way such that when an animal tugged at a piece of bait, a heavy rock fell onto it and crushed it. To make a deadfall trap, a Pomo found two flat rocks, each roughly double the weight of the animal they were targeting. One of these rocks was partially buried in the ground so as to ensure the animal would be crushed. The Pomo then found a stick about twice the height of the animal they were hoping to catch. One end of this stick was filed into a wedge-shaped point, while the other end was put in the ground next to the partially buried rock. The Pomo then found another slightly shorter stick. On this stick, a

notch was carved about three inches from the top. On the other end of this stick, a roughly four-inch piece of cordage was tied on. At the end of this piece of cordage, a two-inch stick was tied on in the middle. Next, a bait stick was made, generally about twice the length of the stick in the ground. The Pomo then put the stick with the notch in it onto the stick in the ground. This was done so that the notch was on top of the wedge-shaped point, and the end with the cordage on it faced away from the buried rock and down. Then the toggle on the end of the cordage was wrapped once around the middle of the stick in the ground. The next step was to carefully lower the other rock onto the point of the stick with the notch. This was all done while holding the toggle in place. Once the rock was lowered on and balanced, the bait stick was added. The bait used was generally a nut, berry, or small piece of meat. This bait stick was added in such a way that the toggle was held in place, thus holding up the rock. One end of the bait stick was put into a small groove on the underside of the balanced rock. The other end was put against the toggle, holding it in place. Then the Pomo left the area for no longer than a day, after which they came back to check their trap. More often than not, the trap had an animal in it (Campbell 59-61).

The Pomo also used a snare to catch rabbits or birds. To make a snare, a Pomo made a piece of cordage roughly three feet in length. On one end of the cordage, a noose was tied, most often just a simple slip-knot. The Pomo then set up this noose across an animal trail. The other end of the cordage was tied to a strong resilient sapling, which was bent down in an arch. Close to the noose, a small stick with a notch in it was stuck in the ground. Another stick, again with a notch, was tied onto the cordage close to the noose as well. These sticks were then put together, their notches holding them in place due to the tension on the cordage from the sapling. When an animal came running down its trail, it got stuck in the noose, detached the two notched sticks,

and was swung into the air by the sapling, where it died. The Pomo often set up as many as three hundred traps in a given area, to ensure a catch (Campbell 57-58).

The fish trap was most often used in streams to catch a variety of underwater animals. The Pomo made it out of a plant called mule fat, which makes long, straight, and somewhat flexible shoots. They started by making about six circular hoops by bending the shoots of mule fat. These hoops were made so that the first was very small, and then they gradually grew until the last one, which was about a foot and a half in diameter. Next, they took about six more shoots and tied them all together on only one end. Then, spreading the six shoots tied together at the base, they laid the smallest hoop into them. They then secured this hoop by binding it to the six long shoots with cordage. They then added the next smallest hoop, and so on, until they reached the largest hoop. The end result looked much like a circular cone. The next step the Pomo implemented to complete the trap was to weave finer shoots into the cone to make it much like a fine net or basket. Then the Pomo brought the trap to a creek or river. They pounded vertical wooden posts into the riverbed and then wove in branches to basically make a fence across the river. The fence was positioned so that from above it would look like two fences stretching from bank to bank, and joining together in the middle in a point downstream. At that point in the middle, the Pomo put the fish trap basket. Then, the Pomo went upstream of the trap, and waded through the water, kicking up rocks and splashing around as they walked towards the trap. By the time that the Pomo got to the trap, there were likely a large variety of animals that had fled from the Pomo and had been funneled into the trap by the fence (Campbell 399-404).

5.45 Basketry: The Pomo made some of the most exquisite baskets in the world. However, I will focus only on simple survival baskets used by the Pomo in this paper.

The Pomo survival basket was used for a variety of purposes, including collecting berries, seeds, and storing nuts for the winter. To make a simple basket, a Pomo first cut six willow saplings, each about two feet long. They then separated these six saplings into two groups. Laying these two groups of saplings across and perpendicular to each other, the Pomo took other more flexible saplings and wove them over and under between each main sapling. Around and around the Pomo wove, adding more saplings when necessary. Using this technique, a Pomo could make a usable basket of almost any shape and size (Brown 225).

5.50 Hide Tanning: The hide of an animal supplied the Pomo with a source of warmth and cover. The Pomo made hides into various forms of clothing or shoes. The process of tanning a hide made the hide flexible and soft, two very important qualities of comfortable clothing.

To tan a hide, a Pomo first soaked it in water for a couple of days. Then the Pomo stretched the hide onto a wooden frame. Once the hide was stretched as tight as possible, the hair was scraped off. The hide continued to be scraped until not only all the hair was off, but it was much smoother and softer. The next step in the process utilized the brain of the animal. The hide was again soaked in water to make it soft and flexible. While it was soaking, the brain was mashed into a paste and heated gently. The prepared brain was then rubbed thoroughly onto the hide and let sit for a couple of hours. Next, the hide was dried and stretched once again on the wooden frame. The hide was then rubbed with a smooth piece of wood until it was even softer and smoother than before. The next step required to tan a hide was to smoke it over a fire. This process set and cured the brain matter on the hide. Lastly, the hide was buffed by rubbing it over a smooth stick. Once the hide was soft and pliable, it could be sewn into various articles of clothing (Brown 257-262).

6. Respect and Awareness: The Pomo had a tremendous amount of respect for the land. They cared for it with love and wonder. To them, the earth was both a great mystery and a great gift. They saw no difference between plants, animals, rocks, sky, and themselves. They saw no difference and thus treated everything equally. The Pomo made sure to ask the land for anything they needed, and always made sure to give a gift in return. Each life they took, be it from a plant or from an animal, was used by the Pomo to the fullest extent. The Pomo recognized the fact that the living being had given up its life for them, and so they treated it with care and respect. The Pomo tended the land as we tend our gardens. They thinned the plants to ensure healthy growth, as well as lit fires to burn the underbrush and give new seedlings a chance to grow. The Pomo hunted animals in a manner that thinned the population, but only to a healthy extent. Overall, the Pomo strove to be in complete harmony with the Earth (Brown 18-20).

The Pomo also had a huge truly incredible awareness of the world around them. As the Pomo walked through the woods, they listened to the sounds around them. They understood the alarm calls of birds and recognized that when they heard this, a predator must be near. The Pomo also looked with awake vision, so as to see any movement in the land around them. Smell alerted the Pomo to which animals were nearby, as they were able to recognize each animal by its own distinctive smell. Additionally, the Pomo used their sense of taste and touch to more fully understand the wilderness around them (Bliss-Wagner).

The Pomo also used their sense of awareness to track and stalk animals. This entailed a detailed understanding of the habits of each animal around them. The Pomo were able to readily recognize the tracks of every animal in their area, as well as read the tracks to determine what the

animal was doing, and where it was going. Once the Pomo had found tracks, and followed them to the animal, they began to stalk silently towards it. This was done by moving extremely slowly, roughly one step every five minutes. The Pomo made sure to move with noises in the landscape around them, such as the sigh of the wind, or the call of a bird. They made sure to stay downwind of the animal so it could not catch their scent. Stalking was an important skill for the Pomo because a spooked animal could generally not be caught. They found both thrill and peace in their hunt, recognizing its importance in their survival. Truly, the Pomo were in harmony with the wonderful and thriving world that they lived in for thousands of years (Neuwirth).

OTHER THINGS I LEARNED THROUGHOUT MY RESEARCH PROCESS: There were some survival techniques that the Pomo did not use, but that I still found to be useful or of importance to my Senior Project. These included the bow drill (which is another way to start a fire by friction), pottery, and the edibility and utility of several non-native plants that were not present at the time the Pomo Indians lived in California.

1. Bow Drill: The bow drill works according to the same principles as the hand drill. The hearth is the same, and the spindle is the same as well, except it is about a third as long. The bow is made from a curved branch roughly two feet in length. There is cordage strung between both ends of this branch. There is a handhold, made from a block of green wood, sized so that it fits in a person's hand. At the bottom of this handhold, there is a hole or depression made so that it fits the top end of the spindle. To start a fire, the spindle is twisted into the cordage, so that a loop of taut cordage wraps around the middle of the spindle. Then, the spindle is placed into the hole in

the hearth, and the top end is placed beneath the handhold, and the hand which is holding rests against the lower leg, supporting it. The bow is then drawn back and forth while downward pressure is applied to the spindle by the handhold. Once a coal forms, the process for its ignition is the same as that of the hand drill (Brown 66-73).

2. Pottery: Pottery is a technique used to make watertight bowls and other storage containers from clay. The first step is to find a source of clay. Clay can most often be found in wet areas, primarily creeks, lakes, and ponds. Once you have found clay, the next step is to get it ready for molding into a bowl. To prepare the clay, you must first pick out any rocks or organic matter ingrained within it. Once the clay is free of all debris, you must add temper to it. Temper can be made from finely crushed up rock; granite works well if you smash it with a harder rock such as basalt. Then, add the temper to the clay. About a cup of temper for every 10 cups of clay is a good amount to add. Once the temper has been added, shape the clay into a bowl by rolling long strips of clay between your palms, layering these atop one another, and finally further securing these strips by pressing them together with your fingers. Once the bowl is completely shaped, you must let it dry for at least a few days. Once it is completely dry, build a fire. When the fire is nice and hot, bring your bowl over to it. Then, very slowly, in the course of at least 10 minutes, bring the bowl closer and closer to the fire, slowly rotating it as you do so. Once the bowl is practically in the fire, push it in, and cover it with branches and coals. Let the fire burn at high intensity for about 10 more minutes before uncovering the bowl, and with a pair of green branches, taking it out of the fire. Let the bowl cool, and once that's done, the bowl is ready to use (Campbell 119-128).

3. Non-Native Plants: There were several non-native plants that I found useful for my Senior Project. These included the following: sheep sorrel, mustard, horseweed, and butterfly bush, as well as several others. I ate the leaves of the sheep sorrel and mustard raw; the sheep sorrel tasted very sour, but refreshing, and the mustard tasted a bit bitter but palatable. I used the straight, dried branches of the horseweed and butterfly bush as spindles for starting fires. I found the butterfly bush to work best with a buckeye hearth and the horseweed with a hearth of cedar (Bliss-Wagner).

WHAT I MADE DURING MY PROJECT: Throughout my Senior Project, I made a large variety of different things related to wilderness survival. Some of the things that I tried to make did not work out, while others worked out very well. The things that worked out well included baskets, a mortar and pestle, obsidian tools, hand drill kits, arrows, cordage, traps, and various dishes using wild foods. Things that did not go as planned included a clay bowl, arrows with foreshafts, a bow, and a couple of dishes using wild foods. Below. I will show pictures if I have them, as well as explain how I made the various items.

1. Baskets: During my Senior Project, I started several baskets, only three of which I finished. One of the baskets which I completed I made from thin willow shoots which I found growing from a creek near my house. I made this basket following the same procedure as that of the Pomo for their survival basket. When I had finished, it measured about a foot across the top, and half a foot deep.

Fig. 1. Completed basket made from willow shoots.

The other two baskets which I completed I made following the same procedure, but from tule shoots, which I found growing in a marsh near my house. As you can see in the photos, on one of the tule baskets I twisted the tule, and on the other, I wove it in as it was.

Fig. 2. Completed basket made from twisted tule shoots.

Fig. 3. Another completed tule basket.

One of the baskets that I started but didn't complete, I also made from willow shoots. However, the process for making this basket was much more time consuming than that of the one I completed. The process differed in that the willow shoots I collected, I shaved down with a sharp rock until they were the same diameter all along the shoot. This obviously was very time consuming, which is the main reason I never finished it.

2. Mortar And Pestle: I made one mortar and pestle for my senior project. Both of the basalt rocks I found on the coast, near Salt Point. The rocks were already shaped fairly ideally by the waves, and all I had to do when I brought them home was to make the depression in the rock which would be the mortar. To do this, I again followed the steps that the Pomo would have

followed. I took a sharp rock, of volcanic nature, and hammered away on the mortar until a depression formed.

Fig. 4. Mortar with just the general shape outlined on the rock.

Fig. 5. Finished mortar and pestle.

This took a very, very long time, and in all honesty, once I was getting closer to completion, I quite simply ran out of patience and used a metal hammer to finish it off. I know, I cheated. However, from this experience, I was able to realize just how much work and time it really took to make a mortar and pestle in the way of the past.

I also made a nut-cracking stone, which was basically a foot wide flat basalt rock with a smaller, round, hand-sized rock to use to break open acorns and other nuts with.

3. Obsidian Tools: One of the skills that I probably focused most of my intention on during my Senior Project was the making of stone tools. I probably spent over 200 hours on this skill alone. I used primarily obsidian as the stone which I made into tools, but I also experimented with various types of chert. I collected the obsidian from a location in Santa Rosa, and the chert near my house.

Fig. 6. Some of the obsidian that I collected for stone tool production.

Through the techniques of flintknapping as the Pomo did, I made over 50 scrapers, 20 arrowheads, and about 15 knives. Like the Pomo, I used a deer antler to flake the blades.

Fig. 7. The deer antlers I used for flintknapping.

Fig. 8. Making a scraper out of obsidian.

Fig. 9. Finished scraper.

Fig. 10. Obsidian knife.

Fig. 11. Obsidian arrowhead.

Fig. 12. A few of the better arrowheads that I made.

4. Hand Drill Kits: Throughout my Senior Project, I made about 10 separate hand drill kits. For the hearths, I used buckeye wood or cedar, and for the spindles, I tried horseweed, butterfly bush, cattail, willow, redwood, buckeye, and mullein. I found the best combinations to be a horseweed

or butterfly bush spindle with a cedar hearth, or a buckeye or butterfly bush spindle with a buckeye hearth.

Fig. 13. Hand drill kit with a buckeye spindle and hearth.

Fig. 14. Proper form for starting a fire with the hand drill.

Fig. 15. Coal forming while starting a fire with the hand drill.

I found that the best tinder nests for blowing the coal into flame were those made of very dry, very fine materials. I found that a combination of bracken fern, cattail, mugwort, fine grass, and mullein worked best.

Fig. 16. Tinder nest of dried grass and crushed, dried turkey mullein.

Fig. 17. The same tinder nest ignited with a coal from the hand drill.

Fig. 18. The fire I started with a hand drill.

5. Bow Drill Kits: During my Senior Project, I used the bow drill quite often to start fires. I found that all the wood which worked for the hand drill worked even better for the bow drill. I also found the bow drill to be far easier and faster to get a coal compared to the hand drill. I found that there were not really any natural fiber cordages which worked well for the string on the bow; they all frayed before a coal could form. So, for my project, I ended up using paracord, which never failed me.

6. Cordage: Throughout my Senior Project, I made a large amount of natural cordage out of a wide variety of wild plants, using the same techniques like that of the Pomo. I made cordage from the fibers of dogbane, three varieties of milkweed, stinging nettle, willow bark, maple bark, and a couple of other barks of various trees. I found that the best and strongest cordage came from the dogbane and milkweed fibers, closely seconded by the fibers of the stinging nettle. The

cordage of the dogbane was so strong, that a piece the diameter of a medium-size worm was too strong to break with my hands. I found tree bark, when stripped fresh off of the branches, made a coarse, thick, and only mildly strong cordage, best for lashing things together.

Fig. 19. Dried dogbane stalks ready to be made into cordage.

Fig. 20. Dogbane cordage.

7. Traps: I only made a handful of traps throughout my Senior Project, and only caught animals in three of them. I made three or four snares and about five deadfall traps. In three of these deadfall traps which were baited with a bit of a trail bar I was in the middle of eating, I caught three mice, all of which I ate of course. I also made a fish trap, which I unfortunately never got a chance to try out.

Fig. 21. Deadfall trap baited with trail bar.

Fig. 22. One of the three mice caught in a deadfall trap.

8. Bow: The bow that I tried to make during my Senior Project was probably one of my greater failures. I gathered a stout, five-foot, straight branch from a bay tree. I let it cure, shaped it, oiled it; and then when I tried to string it up, it exploded in my hands, turning into a multitude of shattered shards. I'm still not 100% sure why it failed, but my guess is that either I carved it too thin or I didn't shape it evenly so that the tension when I strung it wasn't distributed evenly. Whatever the cause, it didn't work, and I ended up using a modern recurve bow whenever I needed one instead.

9. Arrows With Foreshafts: This was another part of my Senior Project which didn't go quite as I planned. I made the mainshaft of these arrows with hazelnut shoots, which I peeled and then straightened over the fire.

Fig. 23. Freshly gathered hazelnut shoots for arrow shafts.

When I tried to make the hole in the mainshaft of the arrow by spinning it on a pointed piece of bone, I had issues getting the hole deep enough, as well as centered. Even more frustrating, was that the end of the mainshaft often cracked and split, mostly because of the downward pressure I exerted as I pushed it onto the piece of bone. I solved this problem by wrapping the lower part of the mainshaft with dogbane fibers. The foreshafts, made from a straight piece of willow, went as planned. I secured the arrowheads that I made from obsidian with a glue of pine sap and charcoal and further secured them with dogbane wrappings.

Fig. 24. Pine sap and charcoal glue being heated and mixed on a hot rock from the fire.

Fig. 25. Three arrowheads secured to the foreshafts of arrows I made.

Fig. 26. The turkey feather fletchings on two of the arrow mainshafts I made.

When I shot these arrows with my modern recurve bow at a cardboard box in my backyard from about twenty feet away and they went completely through the box and embedded in the fence twenty feet behind the box. And they survived the ordeal without breaking at all! That was definitely a moment of satisfaction for me. I made a total of four arrows this way.

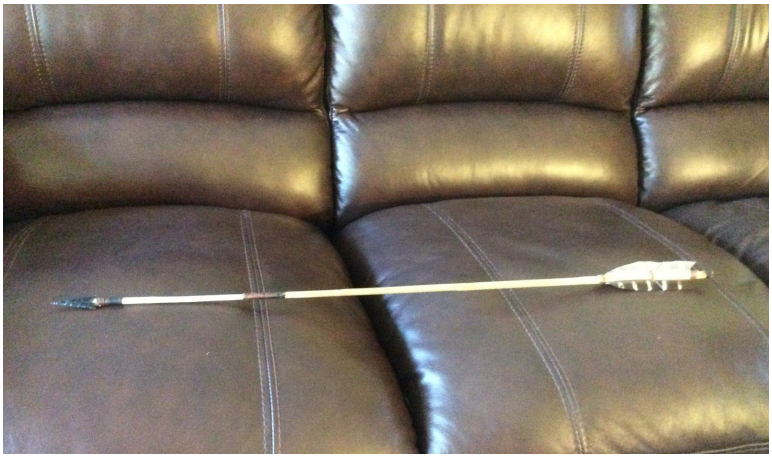

Fig. 27. Arrow with foreshaft put together.

Fig. 28. Arrow with foreshaft separated.

10. Solid Shaft Arrows: In all honesty, I only made two solid shaft arrows for my Senior Project. I made them out of hazelnut wood and used turkey feathers as the fletching. They worked just as well as the other arrows with foreshafts that I made, and they were also way easier to make overall. The arrow in the pictures below I made out in the wilderness, so the quality differs greatly from the other arrows that I made at home.

Fig. 29. The front end of the arrow showing the secured arrowhead.

Fig. 30. The back end of the arrow showing turkey feather fletching.

Fig. 31. Full solid arrow shaft.

11. Clay Bowl: One of my greatest failures was when I tried to make a clay bowl. I gathered the clay from a small creek near my house. Then I made it into a bowl and set it out to dry in the garage. So far so good, but the next morning when I went to check on it, I found it riddled with cracks. Unthwarted, I tried again — with the same result. Then I found out that you have to add some sort of temper to the clay to prevent this problem. So I added some temper, which I made by crushing granite rocks to a somewhat coarse powder. So I made my bowl again, and this time lo and behold, it didn't crack in the drying process! So I set about trying to fire it. I set up a fire in my backyard, and once it was blazing hot, I dumped the bowl into the middle of it and piled wood on top. Well shortly thereafter, I heard several tremendous bangs, like gunshots. I dug into the fire with some wooden tongs, and sure enough, I found a very well fired, but completely shattered bowl. So close and yet so far away! Well, I tried about three more times afterward but had no luck, the bowls still exploded when I put them into the fire. Then, I learned that you have

to acclimate them to the heat very slowly. In other words, you can't just chuck them directly into the fire. So I tried again, and failed again! So I never actually succeeded in making a clay bowl. Instead, I ended up using a clay bowl that I made in the pottery class at Summerfield for the rest of my project.

Fig. 32. Clay bowl being acclimated to the heat of the fire.

Fig. 33. The same bowl almost totally acclimated to the heat and ready to be fired.

Fig. 34. The same clay bowl shattered but still well fired.

12. Carrying Net: I made one carrying net with the purpose of providing me with a way to easily carry my ten-pound mortar and pestle. To make the carrying net, I used a single ten-foot-long string of dogbane cordage that I made and wove it into a net. I used tule cordage for the handle I slung over my shoulder. It ended up working out pretty well, and I was overall mostly pleased with the result.

Fig. 35. Carrying net holding the mortar I made.

13. Fish Trap: One of the things that I made that I never got to try out was a fish trap. I made it out of mule fat shoots, and it seemed like it would work out pretty well. It was about four feet long and two feet wide at the mouth. Unfortunately, I just never got around to testing it out.

13. Wild Food Dishes: Throughout my Senior Project, I made a very large amount of dishes using wild foods. Most of the things that I ate were plant related, but I did have one experience eating animals from the wild. This was when I made the three deadfall traps, caught three mice, cleaned them, cooked them over the fire, and ate them for breakfast.

Fig. 36. One of the three deadfall traps.

Fig. 37. Success!

Fig. 38. Preparing to start the cleaning process.

Fig. 39. Fully cleaned mouse.

Fig. 40. Preparing to roast over the fire.

Fig. 41. Mostly eaten mouse.

Throughout my project, I gathered and ate many wild plants from off the land as well. I tried bay nuts, which fall from bay trees. The outside of the nuts are soft and yellowish and taste

uncannily like an avocado. After eating the outside husks on the spot, I set the nuts to dry for a couple of weeks. Then, I roasted and ate them. They were pretty bitter, but still somewhat palatable in small amounts. Next, I tried seeds from the plantain, which I ground up and turned into flour. I used this flour to make pancakes. They were a very rich brown but overall pretty good. I made the yellow pollen of the cattail into flour as well and used it half and half with regular flour in pancakes. These pancakes turned out to be even better than normal pancakes! I tried eating stinging nettle, plantain, sheep sorrel, redwood sorrel, various grasses, young tule and cattail stems, clover, thistle, miner's lettuce, and mustard. I tried the corms of the brodiaea, which were pretty good, and tasted like potatoes. I ate berries, such as blackberries, thimbleberries, wild strawberries, huckleberries, toyon berries, manzanita berries, currants, and a few others. One of the most important foods I ate was the acorn, of which I was able to collect roughly 30 pounds.

Fig. 42. Canyon live oak acorns on tree.

Fig. 43. Basket of canyon live oak acorns.

Fig. 44. Some of the acorns I collected.

Fig. 45. The process of shelling and grinding the acorns into flour.

I ground the acorns into a coarse meal, which I ran through multiple changes of boiling water to leach out the tannin. Once the acorn meal tasted good, I ate some of it on the spot, and dried the rest in the sun and stored it for future meals. The acorn mush tasted something like very rich, bland potatoes. This bowl I unwisely ate right before basketball practice; a word of advice: don't do that!

Fig. 46. A bowl of acorn mush.

I also gathered pine cones and by heating them in a fire, I opened them. I was then able to take the truly delicious pine nuts out of the cone, shell them, and eat them.

Fig. 47. Pinecone in the fire.

Fig. 48. Pine nuts with skins and shells still on.

Fig. 49. Pine nuts with shells still on.

Fig. 50. Shelled pine nuts.

They were so good that I offered a few to my sister, Emma. But when I went to eat some later on, I found that she had eaten every last one.

SURVIVAL TRIPS: Over the course of my Senior Project I went on several trips that were related to my Senior Project in some way or form. Below are the most memorable moments from these trips.

1. One Hundred Twenty Hour Backpacking Trip In The Yolla Bolly Wilderness: For my first trip related to my Senior Project, I decided to explore the Yolla Bolly Wilderness.

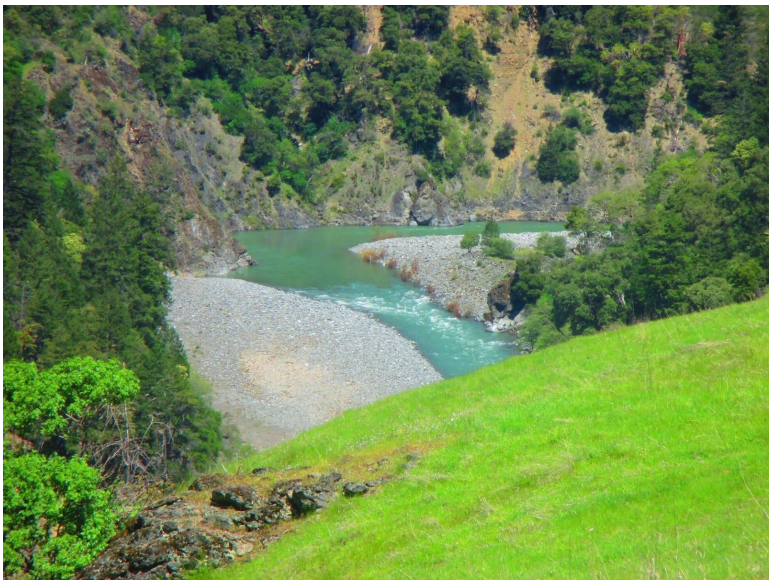

Fig. 51. View from day one near the trailhead.

I went there with my good friend Kai Hensley over Spring Break of 2019. We planned a five-day backpacking trip along a trail we had seen on the map of the area. When we got to the trailhead, we found that a recent fire had caused an upsurge in vegetation growth and within five minutes of hiking, the trail had vanished. What ensued would be a truly memorable trip. Bushwhacking through the head-high brush, sometimes poison oak, we struggled our way along

the route we had planned. The first night, we camped on the bank of the Middle Fork Eel River, which was swollen to near flood stage at this time of year due to the melting of snow on the nearby mountains.

Fig. 52. View from high above the first campsite.

As the evening progressed, I decided to build a deadfall trap from materials on hand, and see what I could catch.

Fig. 53. Deadfall trap.

In the morning, with dawning excitement, I set off to check my trap. As I approached, I could tell immediately that it had been triggered. The heavy rock which Kai and I had so arduously spent getting to balance the evening before, had fallen down. I raced up to it and there, before my eager eyes, was a field mouse, not eight inches in length. I proudly brought it back to camp and started a fire with a bow drill, again using materials at hand except for the string, which was paracord. Then I prepared and cleaned the mouse, and after cooking it over my fire, I ate it for breakfast. Kai, not surprisingly, refused to eat a single bite. The next morning, after setting two more traps the night before, I caught two more mice. I promptly made a fire, and again ate them for breakfast. The rest of the trip I did not set any more traps, but I did diligently start a fire every morning and evening using the bow drill. One exciting moment during the trip was when we were camped beside a beautiful little stream with a waterfall. As we were looking at the waterfall, we suddenly noticed two massive steelhead trout swimming in the pool below the falls. We quickly made a spear out of a straight limb of a nearby tree; and proceeded to spend about three hours trying to spear the fish. We never did spear the fish, but in the process of trying to catch it, we discovered a couple of other amazing things. On a large rock in the middle of the creek, we found an egg laid by some kind of waterbird. The egg was totally unprotected and in the open on the rock, with no nest or anything protecting it. We also caught a turtle lower in the creek, and though I suppose we could have eaten it, we didn't. Another memorable moment occurred around the fourth day of the trip. We were walking down the river, and we came to a fairly large, but not very deep cave in the rock cliff surrounding us. As we walked closer, we saw

several bats flitting about the entrance. If that was not amazing enough, at the base of the cave, we found a pair of huge tracks, which we later determined were from a mountain lion.

Fig. 54. Mountain lion tracks in the sand.

Lastly, we were walking through a wooded area a day later and came across a tree branch that had been scratched by a black bear. Overall, this trip was a great introduction to the world of wilderness survival.

Fig. 55. Bear scratches on a madrone tree branch.

2. Two Nights Solo And A Thirty-Hour Fast At Pepperwood Preserve: For my class's 11th grade trip in May of 2019, we went to a place called Pepperwood Preserve about thirty miles from my house in Sebastopol.

Fig. 56. View of Pepperwood Preserve from near the house we stayed at.

We stayed in a house on the property of the preserve for a week. While there, we got to work with a person named Michelle, who was very skilled in wilderness survival and other wilderness wisdom. Part of the trip was to do a one night solo and optional fast. Since this related so well to my project, I decided to do two nights solo, and fast for as long as I comfortably could. I started my fast after lunch on the fourth day of the trip. That night, I slept on the top of the hill above the house with another classmate Gavin Sellors nearby, but out of sight so that I was all alone. If either of us needed anything, it wouldn't be a problem. Michelle instructed us to lay down a circle of small stones around where we slept, and before we went to bed that night, ask that the stone circle protect us. As darkness grew and having completed the stone circle and prayer, I experienced an amazing thing. A pair of hummingbirds suddenly swooped out of the sky and hovered together a few feet in front of my face. They proceeded to do an entire airborne mating dance together, swirling in front of my face for what was probably only a few seconds but felt like much longer. It was an incredibly wonderful sight to see. That night, I slept better than I had in a long time. Previously when I had slept alone outside, I had trouble falling asleep; my body would clench at any tiny sound or rustle in the underbrush, and my body would be constantly poised to run. But this night was entirely different. I had absolutely no trouble falling asleep, and I slept extremely soundly. I don't know what made me feel so safe and comfortable there; maybe it was the circle of stones. Whatever the cause, I felt like I could handle anything from the woods after that successful night solo.

How wrong I was. After an only slightly hungry day of fasting, I went out for the last solo night of the trip. As darkness settled, I suddenly detected a faint whining sound coming

from above. Seconds later, it was like I had been transported to a warfield. Thrashing in my sleeping bag, I dodged my airborne attackers, slapping at them with my hands. But they were unrelenting. I sincerely didn't expect to get a wink of sleep that night, but all of a sudden, around eleven or so, the mosquitoes vanished, and I fell into a deep sleep. I awoke very late in the morning, covered in mosquito bites, and immediately felt a pang of hunger shoot through me. That promptly ended my fast, as the moment I returned to the house I began to dine heartily. But the experience overall was a healthy and important one.

3. Twenty-Four-Hour Solo And Fast At Taylor Mountain: My first real survival-related wilderness solo trip took place at Taylor Mountain in the southern part of Santa Rosa during the Fall of 2019. During this trip, I brought with me only a camera, a bottle of water, and an obsidian knife that I made. I arrived early in the morning at the base of the mountain to a sky filled with misty drizzle. As I began to hike up the mountain to look for a good spot to make a shelter, it began to rain. The conditions definitely weren't optimal, but I remained unthwarted. I searched for a suitable spot to make my shelter for at least half the day, with no luck. I wanted to find a spot that was flat, somewhat protected from the rain, and had enough downed branches and leaves to make a warm shelter. I also wanted enough cover to keep me out of the sight of people. After much searching, I finally found a suitable spot. It wasn't perfectly flat and only had a scattering of leaves and branches on the ground, but it offered cover and was out of the sight of people. I started work on my shelter. I chose to make a debris hut style shelter, mostly due to the time I had, and the materials on hand. I first cleared a flat spot on the ground where I wanted my shelter to go. Then, I gathered some branches and made the framework of the shelter.

Fig. 57. Framework for my debris hut shelter.

Next, I gathered as many branches and then leaves as I could from the surrounding area, and piled them onto the top of the shelter.

Fig. 58. Shelter covered in leaves.

After I had gathered as many leaves as I could from the nearby area, I still didn't quite feel that I had enough insulation on the shelter to keep me warm throughout the night. Going to a nearby field filled with dead grass from the year before, I proceeded to gather an immense amount and lay it over the top of my shelter.

Fig. 59. Finished debris shelter.

The end result looked to be warm, and by the time I had finished the shelter, it was slowly growing dark. It was also still raining, and I was completely soaked, clothes and all. But, I wasn't uncomfortable or cold luckily. So, with the shelter finished, I filled the inside with more grass, crawled in, pulled a pile of grass in after me to block the door, and tried to fall asleep. I immediately discovered the shelter to be immensely uncomfortable. When I sleep at home in my bed, I am used to rolling around and curling up in positions that the shelter I had made certainly didn't accommodate. I ended up only getting a scattered amount of sleep throughout the long night. Though I didn't get a whole lot of sleep, I didn't get any wetter from the rain still

pounding down, and I definitely was way warmer than I would have been if I had slept out without shelter. That's not to say that I was comfortably warm; I wasn't. But I was warm enough not to shiver or anything like that. In the morning, I found myself to be completely drained of energy. I stumbled out of my shelter, and finding my legs barely able to support my body, which was shaking, I wobbled down the mountain to my car. I can't remember too much from that walk down the mountain, but I remember being a bit scared at how weak I was. I also remember having blurry vision and falling down several times due to my legs being so weak. Looking back at the experience, I would venture to guess that the reason I was this way when I woke up that morning was due to a combination of fasting for twenty-four hours, not getting enough sleep, and being wet and somewhat cold. All I can say is that it was certainly a good learning experience for me, and it opened my eyes to how easily the human body's equilibrium can be altered by the environment it is in, and the effects on you that can have.

4. Fifty-Six-Hour Solo Camping Trip At The Ventana Wilderness: In the late Fall of 2019, I went to the Ventana Wilderness to try to find a place to do my final solo survival trip. The area was recommended to me by my project mentor, Robin Bliss-Wagner.

Fig. 60. View of the Ventana Wilderness from the top of a large sandstone outcropping.

After a five-hour drive down south, I arrived in the Fort Hunter Liggett Military Base, which I had to drive through to get to the wilderness. I quickly discovered that the base had never made bridges over the rivers that ran through the property. Having a Toyota Prius, I was very glad there had been no rain because my car would never make it through some of the rivers I had to cross that day. Once I reached the place recommended by my mentor, which was a huge sandstone outcropping, I parked my car and got out to explore. I had left my house very early in the morning, so I got to the wilderness just after 10. The sandstone outcropping my mentor said was worth exploring was supposedly filled with caves and caverns. I made the short walk to this place and was immediately amazed. In the first cave I walked into, the sandstone floor was filled with mortar holes from when Native Americans were grinding acorns long ago. The cave was about 10 feet tall, 20 feet deep, and 50 feet wide. Obviously, this cave had been home to a large

number of people. The roof of the cave was blackened, presumably by all the fires the Native Americans made.

Fig. 61. Side view of the cave showing blackened roof and in the foreground, mortar holes.

Fig. 62. Mortar holes in sandstone boulder in the cave.

Fig. 63. Close up of one of the mortar holes.

There was also an immense amount of broken shells and shards of chert littering the floor. The Native Americans must have collected these shells from the coast as a food source. The coast is over 30 miles away from this cave and the journey would have been a tough one, traversing extremely steep slopes. The chert flakes were all that remained from the Native Americans' process of flint knapping stone tools. This cave really took my breath away, and for a moment I felt like I had been transported to another time. I continued to explore this huge rock outcropping and found several other smaller caves, all with evidence of Native American use.

Nearby this rock outcropping, I found a small creek. As I walked down the creek, I discovered a multitude of milkweed plants growing nearby. These plants are very good for cordage, so naturally, I was very excited and proceeded to collect some of the plants to make into cordage sometime in the future.

Later in the day, I drove about five more miles down the road to the campground. There, I set up all of my camping gear and began to explore the area around the campground. I quickly discovered a large amount of immense valley oak trees nearby. As I walked among them, I noticed that there were many acorns littering the ground around the trees. I began to collect these, putting them into the stuff sack for my sleeping bag, and within about half an hour I had collected nearly 10 pounds.

The next day, I hiked up a steep slope and found a stand of knobcone pine trees. On the trunks of these trees, pine cones were growing in clusters straight out of the bark. I had never seen pine cones grow out of the trunk of a tree before; normally they grow on the branches. I later learned that this is a common trait of knobcone pine trees. I collected three of these pine cones and brought them back to my campsite. Since there was currently a seasonal ban on campfires, I was unable to heat up the pine cones in the coals of a fire to open them. However, since cooking stoves were allowed, I decided to hold the pine cones over the flame of my stove. This method actually worked quite well, which was a bit surprising. After I got the pine cones open, I shelled and ate them. They were very good, if a bit small. But I had collected enough that the fact that they were small didn't really bother me, mostly because every pine nut was absolutely delicious.

Later that day, as I was climbing a nearby sandstone boulder, I found a big berry manzanita bush absolutely overflowing with berries. The berries had been dried by the sun, and I was able to easily break the skins and meat off of the pit on the inside. They tasted amazing, sweet, tart, and refreshing, and I ate quite a few and collected about 50 others.

On the last morning of the trip as I was driving out of the wilderness, something occurred that would change my Senior Project in a very good way. The main reason I had gone to the Ventana Wilderness in the first place was to try to find a good place to do my final solo survival trip. And, as I was leaving, I found just that. It happened as I was driving across a small creek, which I later learned was Santa Lucia Creek. I happened to look at the hillside to my right, and I caught a glimpse of what I thought might be a small cave about halfway up the hill. I pulled to the side of the road and began to hike toward where I thought I had seen the cave. As I caught my first real look at the cave, I heard a sound near the creek flowing to my left. I turned my head and saw a coyote and its pup trot from the creek to the hillside in front of me. As they disappeared around the other side of the hillside, I had an immediate feeling that this was the place. I went into the cave, which was really a large sandstone overhang, and began to check it out. There was adequate protection from the weather, a reliable nearby water source, and numerous oak trees. Yucca plants grew above the cave, along with many toyon bushes. Inside the cave, just like the other one, there was clear evidence it had been the home of Native Americans in the past. Shells and chert flakes littered the floor, and the roof was blackened. There were no mortar holes in the cave, but I did find three in a boulder beside the creek. There was a wonderful view from the mouth of the cave as if it wasn't already good enough. I made the decision there and then that this would be the place I would do my Senior Project final solo survival trip. I left the wilderness that day feeling much lighter, and already excited about my final trip.

Fig. 64. Sandstone cave.

Fig. 65. Close up of the best area for sleeping in the cave.

Fig. 66. View from the cave.

(Yes those are cows that you see, and no I don't know why they are there).

Fig. 67. Santa Lucia creek near the cave.

5. Sixty-Four-Hour Solo Camping Trip At The Ventana Wilderness: In January of 2020, I made another trip down to the Ventana Wilderness. By January however, there had already been a significant amount of rainfall in the area, and as a result, the route I had taken the first time was flooded and impassable. So, since I couldn't go to the place I had gone the first time, I decided to drive down the only road accessible to my Prius, and see what I could find. This was the Nacimiento Fergusson Road, and on the map, I had seen a couple of campgrounds nearby. I left my house very late; around three in the afternoon. It was absolutely pouring rain on my drive down to the wilderness, and I was detoured several times due to the 101 freeway being flooded. When I finally arrived at the first campground on Nacimiento Fergusson Road, it was already dark and still pouring. I hurriedly set up my tarp, crawled underneath, got into my slightly damp sleeping bag, and fell asleep.

I awoke to a cloudy, but dry day. Grateful that the storm was over and I could explore the wilderness in peace, I quickly cooked up a breakfast of ramen. Then I began to check out the area surrounding the campground. There was a creek running nearby, and there were canyon live oak trees that had dropped many acorns. Although they were damp, I collected about two pounds of them.

Fig. 68. First campsite showing canyon live oak trees.

Later that day I made the short drive down to the second campground, which I found to be more open and welcoming. Here, I found a single canyon live oak tree that had dropped more acorns than I had ever seen in my life. At this one tree alone, I collected more than 10 pounds of acorns and could have collected much, much more.

Fig. 69. Some of the acorns I collected.

At the top of the hill above this remarkable tree, I found a ponderosa pine tree that had dropped three large pine cones. These pine cones had obviously been sitting there for some time, and I wasn't sure if I would find any edible pine nuts in them when opened. Using my camping stove, like last time, I opened them up and removed the pine nuts from inside. As you can see in the picture below, I was only able to collect about 30 good ones or so in total, as many of the nuts were rotten.

Fig. 70. Pine nuts from a ponderosa pine tree.

Later that day, I drove to the far eastern edge of the wilderness. There, after walking down a steep hill to a river, I found a patch of dogbane. I collected about 50 or 60 stalks, which I planned to dry and make into cordage when I got home. I also found a bit of milkweed growing nearby, which I also collected for cordage.

Fig. 71. The river where I found the dogbane and milkweed.

Fig. 72. Dead milkweed seed pod.

On the second, and last night of my trip, it began to rain again. As I lay in my sleeping bag, I listened to the rain getting harder and harder, until it sounded like thunder on the tarp

above me. Soon, small rivers of water began to flow under my tarp and into my sleeping bag. I sprang from underneath the tarp and made a mad dash to my car 20 feet away, dragging my sleeping bag after me. Temporarily sheltered in my car, I started trying to decide what to do. If I stayed at the campsite, I would either have a very wet night under my tarp, or a very uncomfortable but dry night in my car. I couldn't decide what to do. But then I remembered something. On my way into the campground, I had crossed a low bridge over a fairly large creek. And on the bridge, there had been a sign which had said the following:

WARNING: FLASH FLOOD AREA!

WATER MAY RISE WITHOUT WARNING!

BRIDGE MAY FLOOD!

Fig. 73. Flash flood warning sign on the bridge.

I immediately realized that with this heavy rain, the chances of the bridge flooding were fairly high. I quickly raced back out into the driving rain, and fumbling about in the darkness, managed to get my tarp down and all my belongings in the car. Then, I pulled out of the campsite and began my way down the road. It was one in the morning as I started my drive home. When I got to the bridge, I was very thankful that I had left the campsite when I did. The water was roiling and muddy and was just starting to flow over the bridge. I had to drive through a couple of inches of water to get across. After getting across this hurdle, I continued the long

drive home, and finally, at six in the morning, I arrived. This trip was important because I found many useful plants that I could use for my final solo survival trip.

6. Final Fifty-Hour Solo Survival Trip At The Ventana Wilderness: Before I had even started my Senior Project, when it was all just an idea, I had planned to end my project with a final solo survival trip. That plan had not changed and so, during February Break of 2020, I went back to the Ventana Wilderness to the cave I had found on my first trip there. With me, I brought all that I had made throughout my Senior Project, as well as some supplies for emergencies, which I planned to keep in my car.

Fig. 74. What I brought with me.

I left my house at three in the morning so that dawn was just breaking when I pulled up to the trailhead. I put all of my things in my baskets and set off towards the cave. When I got there, I first made a fire using a hand drill. The spindle of this hand drill was made from a dried butterfly bush shoot and the hearth from a buckeye branch. I gathered some dry grass for my tinder nest and added some turkey mullein for added fluffiness. Once my fire was started, my hands were covered in blisters and I was hot, tired, and very thirsty. One of the things that I had brought with me was a large clamshell which I had planned to boil and purify my water in since I had never successfully made a clay bowl. But what I hadn't accounted for was that the creek was

way down a very steep hill and I would have to hike back up the hill without spilling the water in the shell. In the end, I simply gave up. The piddly amount of water that I was able to get to my camp mostly evaporated when I tried to heat it up, and what was left never even came to a boil. So, sad to say, I walked down to my car and got out my water filter and clay bowl made in school at Summerfield. I used the water filter to purify my water for the remainder of the trip, and the clay bowl for cooking.

Next, I started work on my shelter. I made it so that the fire would be at my feet, and the rock wall behind the fire and above me would reflect the heat back at me. The bedding I made from the branches of a soft plant I found growing nearby. In all honesty, I'm not sure what type of plant it was.

Fig. 75. Finished shelter.

Fig. 76. Close up of the fire and rock wall.

After my shelter was finished, I decided to cook up some acorn mush. I put some water in the clay bowl and brought it to a boil**.** Once it was boiling, I poured some acorn flour into it. The acorn flour was from acorns gathered in the Ventana Wilderness during my first trip there. It was very filling and just what I needed.

Fig. 77. Boiling water in the clay bowl.

Fig. 78. Cooking acorn mush in the clay bowl.

Fig. 79. A bowl of acorn mush with a yucca stalk spoon.

Later that day, as I was walking near the creek, I saw a ground squirrel on a rock. I quickly raced back to my cave and grabbed my bow and several arrows with foreshafts I had

made. Then, very quietly, I crept up behind the squirrel. Once I was close enough, I let fly one of my arrows. It missed just barely, skimming the ground squirrel's head. The squirrel was gone in a flash, and I went to where the arrow had landed to retrieve it, only to find that it had vanished. I returned to my cave unsuccessful. That evening, after eating another bowl of acorn mush, I stocked up enough wood to keep my fire going all night**.**

Fig. 80. All stocked up on wood for the night.

Then, I lay down on my bed of soft branches and fell asleep. I woke several times throughout the night to add wood to my fire. Overall, I was pretty warm, and considering the fact that it was below freezing when I woke in the morning, I was pleased with my shelter as a whole. I know it was below freezing because I checked my car thermometer just for fun to see; it read 27 degrees. When I woke in the morning, I was greeted with a wonderful view from my cave. Well, I had some more acorn mush for breakfast. I also ate a few pine nuts and toyon berries. Lunch was also a bowl of acorn mush. After lunch, I went on a short walk around the

surrounding area to try to get to know it better. I explored the creek, where I saw several small trout. Then, on my way back to my cave, I discovered something quite incredible. Underneath an oak tree, I found an entire barn owl head. That's right, head, not skull. The head still was covered in feathers and although was dried out, still looked very alive.

Fig. 81. Barn owl head.

After this find, I tried to set a deadfall trap where I had seen a ground squirrel the day before. I tried using a pine nut as bait. Next, I made an arrow from a shoot of hazelnut I had brought with me. I made the pine sap and charcoal glue, secured the arrowhead with dogbane, and used several turkey feathers I had brought with me as fletching. Soon, it was time for dinner which, not surprisingly, was another bowl of acorn mush. When I went to bed that second night, it had just started lightly raining, but I was nice and dry underneath the overhang.

When I woke up in the morning, I went to check my trap; it was empty. I made a bowl of acorn mush and decided then and there that I was ready to go home. I dismantled my trap, burned my bedding, put my rocks from my rock wall back where I had found them, and overall did my best to make sure that I left no trace that I had ever been there.

Fig. 82. Leaving as little trace as possible.

I decided to go home earlier than expected mostly because I found being alone in the wilderness for so long to be not physically strenuous as I had expected, but mentally strenuous. I found that the day stretches forever, and it's not that it’s really boring or anything, there's plenty to see and observe, but everything is just very slowed down. It's so unlike anything we are used to in our everyday fast-paced, busy lives. There were times that I felt a bit lonely, but in all honesty, it was simply the lack of anything to do that finished me off. I had spent about two full days with my thoughts, the natural world, and nothing else to distract me in any other way.

Even though the trip wasn't as long as I first imagined and didn't quite go as planned, I was overall happy with the result. I learned that acorn mush is very filling; I was never really very hungry. I also learned that wet, rotting oak bark is the best wood to use in the fire at night because it burns so slow. When I got home, if I remember correctly, the very first thing that I ate was a massive burrito from one of my favorite Mexican restaurants in Graton. It definitely made for a fitting and filling end to my final Senior Project trip.

WORK WITH MY PROJECT MENTOR(S): Throughout my Senior Project, I worked with a number of different people who acted as project mentors to me. The main person I worked with was Robin Bliss-Wagner, who then recommended I briefly work with several other people including Jay and Michelle.

1. Work With Robin Bliss-Wagner:

1.1 First Trip: In January of 2019, two of the teachers at Summerfield, Bob Flagg and Molly Sierra, told me about a man named Robin Bliss-Wagner who they said would be the perfect Senior Project mentor for me. Having never met the guy, I was a little nervous when my mom drove me up to Fort Bragg to stay at his house for two days in mid-February. After a three hour drive, we arrived at his house at around eight in the morning.

The man who greeted us very quickly crushed any fears that I had about having a Senior Project Mentor. Robin started off asking me about my project, and what my plans were. Then, he began to show and explain innumerable skills related to wilderness survival. One of the first things that he taught me was how to make a bead out of a mussel shell. A shard of the shell was

drilled into with a sharp piece of obsidian or chert attached to a straight stick and spun in the hands in the same way as when using a hand drill. Then, the edges of the shell were ground down on a slab of sandstone until they were circular. These beads, Robin explained to me, were to be used to thank and show respect for the land when gathering from it. For example, if you gathered acorns from beneath an oak tree, leaving a bead there when you were finished would be a way to show thanks to that tree for the acorns it had provided. This was the first thing that he taught me, and it stuck with me throughout my project. I made many beads, out of all different types of shells, and used them to show my thanks whenever I harvested from the land. I found it to be a truly rewarding experience to leave something that had taken me time to make as thanks to the land. It gave me a distinct feeling that I was connected to the land in a new way, and that the land was connected to me.

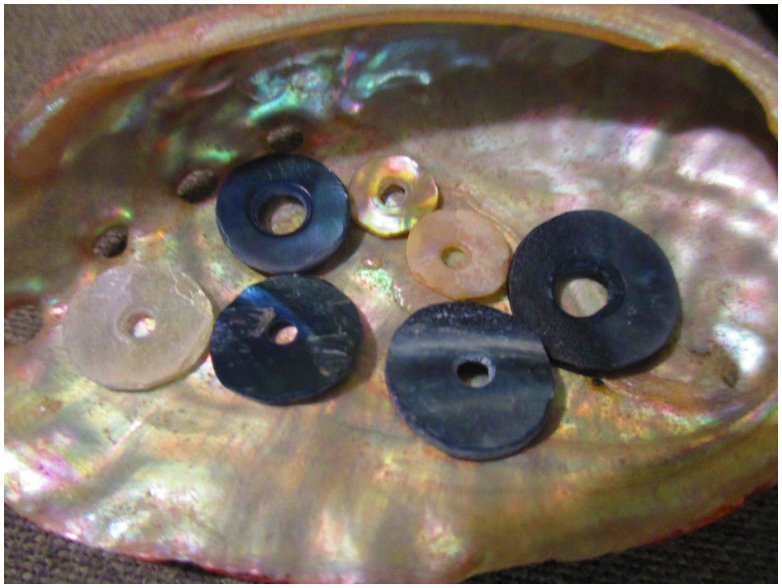

Fig. 83. Shell beads that I made.

I honestly don't remember the precise order of the many skills that Robin taught me during the next two days, but it included tracking, stalking, making cordage, using a bow drill, flintknapping, and making snares from the cordage we made.

One of the things that he taught me to do was tracking and stalking. We walked down to the nearby beach, where we found many different tracks including deer, otter, and someone's large pet dog. He showed me how to tell from the tracks when the animal had been moving quickly or slowly, and what the animal had been doing at the time that it left the tracks. Next, he brought me to a trail, where we practiced various stalking techniques and paces. He showed me three main different types of tracking paces. The first is known as fox walking, named so because it mimics the techniques a fox uses when it walks across the land. When fox walking, Robin taught me to use a smooth flowing stride and to roll silently from the outside to the inside of your feet. This technique keeps you alert to any disruptions in the surrounding area. It is excellent for searching for animals to hunt. Once you have spotted an animal, you must switch to the weasel walk. In performing this walk, you drop into a low crouch and move half as fast as during the fox walk. Once you are fairly close to the animal, to avoid detection, you must slow your steps to an extreme. Taking a step as slowly as one per minute, you must silently glide and flow across the landscape. You must be completely alert in order to freeze should the animal look up. Moving only when other sounds occur in the area, such as a bird chirping, or a breeze through the leaves of the trees will increase your chances of getting as close to the animal.

Robin had me make cordage from dogbane he had collected from a location in Lake County. With this cordage, we then made our way to a nearby wooded area where he had seen rabbits before. When we got to the spot, we saw many small trails through the grass where the

rabbits commonly traveled. On three of these trails, he taught me how to set snare traps. We then left the area for five or six hours. Robin told me it is important that you don't leave your traps for too long, as a trapped rabbit might suffer unnecessarily, or be eaten by other predators. When we returned to the area to check on the traps, we found that unfortunately, we had been unsuccessful. Robin said that if we had set more traps, we might have been more successful. It was a large area, and with only three traps set, the odds of a rabbit coming down those particular trails were obviously not as good as if we had set a trap on every single trail in the location.

At about 10 PM that night, I was in the garage reading books on wilderness survival that Robin had given me the opportunity to look at. All of a sudden, in rushed Robin with a look of excitement on his face. He told me that he had just seen a skunk walking around in his front yard, and motioned for me to follow him out to see it. We fox walked to the front yard, where we immediately saw the skunk. It was snuffling along the lawn, searching for food. We switched to a weasel walk, and slowly crept after it as quietly as possible. The skunk soon left the grass and headed into some bushes. As we stood at the edge of the bush it had gone into, we all of a sudden heard a series of sharp squeals. Peering with excitement into the bush, we quickly determined that the skunk was eating something, which was further proved by the loud crunching sound emitted from inside the bush. Thinking at first that the skunk had caught a mouse or vole, we soon realized we were wrong. The crunching sounds ceased, and the skunk strolled out of the bush with an eggshell hanging from its mouth. Realizing that the skunk had found a nest of chicken eggs laid by one of Robin's chickens, we continued to follow it to another bush. Here, the skunk stopped, with its tail hanging out of the bush, and the rest of its body inside. Going as slowly as possible, Robin and I crept ever closer. Then, when we were within reach, we knelt

down on the ground and were able to touch the tail of the skunk, without any reaction from it. Excitedly, we continued to gently run our fingers along the tail for at least a full minute, before the skunk went deeper into the bush. That was truly an incredible experience, and although a bit risky, it was totally rewarding in so many ways that it's pointless to try to list them. I honestly couldn't believe that we had actually just run a skunk's tail through our hands without the skunk running away or spraying us for that matter. Truly unbelievable.

Overall, these two days were a huge turning point in my Senior Project. This experience with Robin marked the moment that my project truly became an in reach reality instead of just a distant foggy vision.

1.2 Second Trip: About two months after the first trip to Robin's house, I went there again, this time for two nights instead of one. During these three days, he taught me how to make a deadfall trap, kill and butcher a sheep, and also further strengthened the skills that he had taught me the first time I was there.

On the first night with him, Robin brought me to the garage, where he proceeded to help me with starting a fire with the hand drill in a very unique way. Most of the reason that I had trouble getting a coal was due to the fact that I could see the smoke emitting from the wood, and thus overestimated where I was in the process. The frustrating result was that I would often run out of energy right before I got a coal to form. Robin helped cease this problem by having me do it blindfolded. When blindfolded, I was unable to see where I was in the process, and although it was still challenging for me to get a coal, it was definitely easier than if I had been able to see.

On the last day of the trip, Robin let me help kill and butcher a sheep. He had me help with this so that I would know how to process an animal should I catch one during my Senior Project. The main principles of butchering a sheep can be used to butcher other mammals.

We arrived at the nearby farm early in the morning. The sheep, which was an immensely wooly one, was led into an awaiting van. Then, following in Robin's car, we drove to the home of Robin's friend. We led the sheep out of the van and tied it to a tree while we got ready. Once we had set up a tarp on the ground, put a log across the tarp, and tied a rope to a tree above the tarp, we untied the sheep from the tree. Then, we led the sheep over to the tarp and tied all four of its legs together, so it was essentially immobile. We placed the sheep so that its head was propped up on the log, and Robin got out a small bucket and placed it near the sheep's head. At first, I was confused about the purpose of this bucket, but it wasn't long before I found out.

Robin's friend planned to try to kill the sheep in a new way, one that he had heard was quite easy and successful. As the sheep lay across the log, Robin's friend took an ax, and with a mighty swing struck at the sheep's neck. I remember distinctly the way that the sheep's eyes rolled back into its head and the way its whole body continuously clenched and unclenched. The ax, however, was less sharp than we had thought, and it really didn't cut into the sheep's neck very well. So, Robin had me hold the sheep's head down tightly while he made the final cut with his knife. He jabbed the knife down into the area behind the sheep's lower jaw, and then pulled forward, slicing through a major artery. I remember feeling the entire head clench and writhe in my hands as the knife made the final cut. I remember what a powerful moment it was to feel the last of the sheep's life slip through my hands. The instant Robin had completed the cut, he grabbed the bucket and placed it under the sheep's neck. A geyser of blood shot out of the neck

at a rate close to that of water out of a garden hose, and into the bucket. The geyser of blood was over in seconds, and in those few seconds alone, the bucket was substantially filled. Robin told me that the blood was to be used in pancakes, for apparently blood, when heated, hardens into substance about the density of a pancake.

After the sheep was dead, we hung it upside down from the rope in the tree. Then, Robin proceeded to show me how to take the hide off the sheep. Robin first cut off the sheep's legs at the knee joint. Then, Robin made a shallow centered cut from the base of the tail all the way down to the chin of the sheep. Once this cut was completed, he carefully removed all the internal organs, making sure not to puncture any of them, and tying off any that were leaking. Once all the organs were out, he sorted through them to find the organs that were good to eat. These included the heart, liver, kidneys, and lungs. Then, on all four of the sheep's legs, Robin made cuts running from the knee joint to the center cut. Once he had made these cuts, he began to carefully peel the hide off the sheep. I was able to help quite a bit during this process. We had to take great care that the hide was not torn in any areas, as a hide with a hole in it would be far less useful when it was tanned and made into clothing. Whenever there was an area where the hide was stuck to the flesh, we used a razor blade to help separate them. Eventually, we were able to remove the entire skin with minimal tearing. The only areas where there were any tears were near the edges, which was obviously way better than if there had been one in the middle.

After the hide was removed, and the whole animal cleaned, we wrapped it up in a cloth and left it hanging to cure for a while. Then, we went inside, where Robin and his friend prepared some of the sheep's organs. I, being a vegetarian since I was born, had never tried meat from anything other than a fish, so this was all new to me. But, I was happy to try some, and I

ended up eating a fair portion of the heart. It was pretty good to be completely honest, though I'm not sure that I would eat it again if given the choice.

Overall, this trip with Robin illuminated an entire side of wilderness survival that I had been missing. Robin taught me to trap, skin, clean, and cook an animal. These were all skills that I had more or less ignored up to now, and as I found later, knowing them provided me with food and a great story during one of my Senior Project trips about a month later.

Overall, I found Robin to be the best mentor that I could have wished for, with a great sense of humor, knowledge, and wisdom. He not only taught me wilderness skills but life lessons. He was, without a doubt, an invaluable resource and guiding hand for my entire Senior Project, and I am extremely grateful for all that he did for me.

2. Work With Jay: One of the people that Robin recommended I hang out with was a man named Jay, who lives near Bodega. In early October of 2019, I made the short drive to his house, where I spent the full day with him.

When I arrived, Jay first led me on an hour-long hike around his property, which was quite large. Once we returned to his house, he told me that he was planning on building a grass hut on his property and wanted to know if I would be interested in helping build it throughout the day. I naturally agreed, and we started to work immediately.

The first thing that Jay had me help prepare were four 10 foot long trunks from young douglas fir trees he collected a few weeks before on his property. He had me shave any branches or rough areas off of the trunk using a machete. Then, using strips of rawhide from a deer whose hide Jay had recently tanned, we tied the four trunks together in two pairs about a foot from the

top and spread out the trunks below where they were secured. This made two A-shaped frames. The next step was to take another 10-foot long tree trunk and lay it across the two A-frames, with each A-frame on either end of this new trunk. Then the trunk laying across the A-frames was tied on securely to the A-frames. This made a very general layout of the shelter's shape.

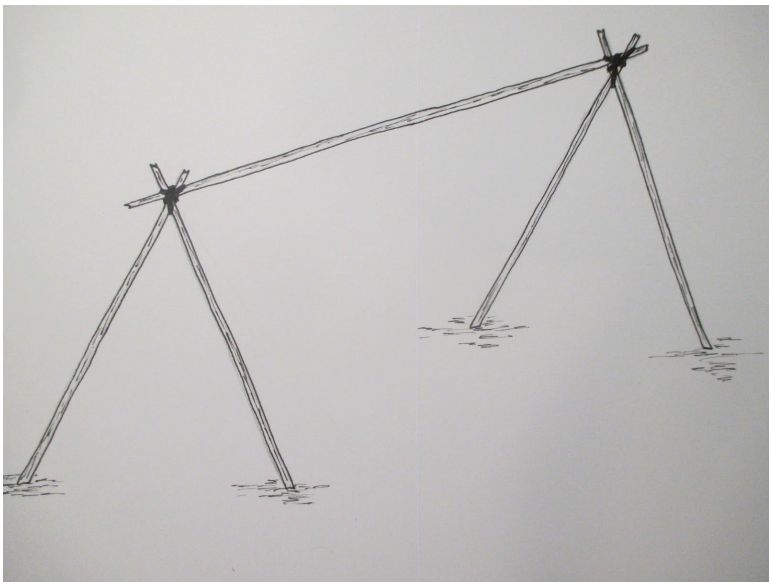

Fig. 84. A-frame grass hut general structure.

Next, we secured multiple trunks parallel to the top trunk all down both sides of the A-frames.

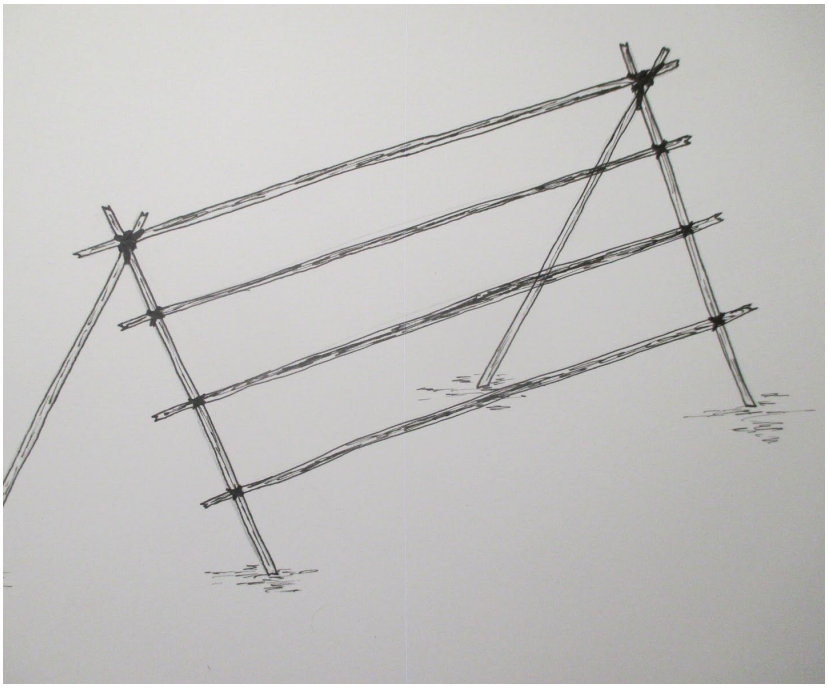

Fig. 85. Grass hut framework completed on one of the sides.

The next step was to collect as much grass as possible. Jay's whole family, several of his friends, and I spent at least half the day alone collecting grass to use for the hut. In the end, we were only able to collect enough grass to cover a little less than half of the entire framework. That opened my eyes to how much work really has to go into the construction of a grass hut.

After we had gathered as much grass as we could, we attached 10-foot hazelnut shoots to the framework. These shoots were attached on top of the most recent trunks we had secured to the framework; the trunks that ran parallel to the top trunk. We attached these shoots only on one side of the framework. Then, we slipped a bundle of grass between the lowest hazelnut shoot and the lowest douglas fir trunk, so that it hung down to the ground. This bundle of grass was about a foot wide, and at the end of it, we tied the hazelnut shoot to the douglas fir trunk, securely clamping the grass between. Then, we put in another bundle of grass and clamped it the same

fashion beside the first. We continued down the line until the whole lower row of the framework was covered in grass. Then, we moved to the row above, clamping bundles of grass between the two branches so that they overlapped onto the bottom row. This overlap was crucial, according to Jay, because it allowed water to run off without entering the inside of the hut. With all the grass we had collected, we were only able to finish the two lower rows before it was time for me to go home.

I learned quite a bit from Jay throughout this day, and by the time I left, I felt that I had gained a thorough understanding of how to make a grass hut. Jay illuminated for me just how much work is required to make even a primitive shelter suitable for living in for long periods of time.

3. Work With Michelle: It was basically a lucky coincidence that led me to work with Michelle. My class was planning a trip to Pepperwood Preserve, and by pure luck alone, Michelle was chosen by the school to be the leader. It turned out that she was one of Robin's good friends, as I later discovered.

Most of the work that I did with Michelle has already been covered in this paper from during my trip to Pepperwood Preserve. Overall, Michelle taught me a great deal, including helping me with the hand drill and teaching me about the uses of several medicinal and edible plants, including yarrow, red clover, and brodiaea. Most importantly, Michelle taught me how to really become one with the natural world, through honoring, respecting, and thanking it, such as during my first solo night at the preserve.

WHAT I LEARNED FROM MY PROJECT:

1. Successes: Overall, I think that as a whole my Senior Project was a tremendous success. Most of the things that I made worked out far better than I expected, and my trips went well for the most part, and I learned an incredible amount from all of them. One of my biggest successes was probably just the fact that I was able to do so many different things throughout my project. I am very thankful that I started my project in 11th grade, as this gave me much more time than if I had started earlier, and made the final result of my senior project much more whole.

2. Challenges: I did encounter many challenges throughout my Senior Project. Many of these were small, such as the bow or clay pot disaster, while others were larger. One of the largest challenges that I faced was trying to find a suitable spot for my final solo survival trip.

The main reason that it was so incredibly difficult to find a good place to do my final solo survival trip was because of increased fire restrictions due to dry conditions that year. I probably spent more than 50 hours just trying to find a spot where I could legally build a fire. Another thing that I found challenging was trying to find a place that had a spring from which I could drink. I was hoping to find a spring so that I would not have to go to the trouble of purifying my water (this was after my clay pot disaster).

In the end, I never did find a place with a reliable spring. Regarding the fire restrictions, there were no wilderness areas that allowed any fires before December 1st, so I had to wait until then to be able to start my solo survival trip. However, once the rains came my first choice area

became impossible to access due to flooded roads, so I had to wait until the roads were clear before embarking.

Another challenge that I battled with during this project was my dislike of meeting with or talking to people I had never met before. I am generally a very shy person and this project at times really pushed my limits. When I had to stay several days with Robin, who I had never met before, saying that I was nervous would be an understatement.

3. What I Learned About Myself And How My Project Changed Me Into The Person I Am Today: My project taught me many things about myself. It taught me how my body reacts to lack of food, cold, or stretched comfort levels. I found that when I have not eaten for a long time, I become tired and weak. I found cold to only increase these symptoms, making them worse. When my comfort levels were stretched, I found that though I am inclined to not want to give up, I still have the ability to end something before it becomes dangerous.

One of the most important things that I learned about myself is that when something interests me, I am unstoppable in my efforts to discover all that there is to know about it. I found that when I have the motivation, the results of my work can be much more than I thought myself capable of.

One of the ways that my project changed me is that now I am less afraid of talking and working with strangers. To be honest, I still do my best to avoid meeting strangers, but I found that if I have to, I'm actually not bad at it and there isn't really any reason to be shy. I found that I am starting to change in this regard, and though I probably won't ever be an incredibly sociable person with strangers, I have the ability to be deep inside me.

Overall, I think that the main way that the project changed me was that I was able to discover the true importance of Nature. I realized that even today, with our cars and machines, we still rely fully on Nature for our survival. We may not be as closely connected to it as we once were, but the fact remains that we still are. All our numerous convenient inventions are still tightly linked to the thread of Nature which binds us all.

Through my research, I came to understand how the Pomo Indians of California lived in a way which both honored and cared for Nature. I started to realize how the Pomo, by fully depending on Nature for their survival, learned to care for it in the best way possible. I understood that this care and respect allowed them to live off the land for thousands of years, with little ill-effect on the Earth. The Pomo acquired such an intimate bond with Nature, that they were able to fully realize its importance. Knowing this, they were able to care for the land in a way which caused it to thrive and flourish, thus aiding their survival.

By coming to this understanding of the great care and respect the Pomo Indians of California had for the land, I realized just how detached from the natural world we as a society are today. I see today that we use Nature as we wish, forgetting that if we destroy it in our ignorance, we will all perish. During this project, I started to realize that wilderness survival is something we should look towards as a solution.

This was further realized during all of my various survival trips. During these survival trips, I really could feel the connection that I had to the natural world, and sometimes the lack thereof. When I felt I had a close connection I found myself to be a happier, more grateful, and overall a more optimistic person. When I didn't feel a connection I felt confused, angry, and

restless. Today, our world has the qualities of a place without a close connection to nature. And we must change that.

My project inspired me to further investigate a way that our society could live in closer harmony with the land. If this could be successfully done, it is my opinion that the earth, and all forms of life which call it home, would be able to exist together with respect and sustainability. I strongly believe that were able to do this in our world today, we would find that we could live both comfortably and in harmony with Nature for centuries to come.

5. Conclusion And Thanks: In conclusion, I would say full-heartedly that this Senior Project was far more than I could have expected or wished for. It was truly how much I was able to accomplish, and how much I grew from all of my experiences. I am so very grateful to my parents, sister, and grandparents for helping me find a mentor, letting me embark on my final solo survival trip, and supporting me in so many other ways throughout my project. I am also extremely grateful for all the wonderful and life-changing experiences my project mentor, Robin gave me. With the help from him and so many others, this project became a reality.

WORKS CITED

"A Friction Fire Inquiry: Bow Drill." *Thomas J. Elpel's Web World Portal*, 1997, www.hollowtop.com/Articles/Friction_Fire_Woods.htm. Accessed 23 April 2019.

This article conducted a study on which Californian woods work best for bow drill fire starting. I found the article very useful because it showed me the best wood to use for bow drill in California. I was also able to use the article in relation to the hand drill, as the woods used for bow drill and hand drill are similar. The article's topic only covered a section of the topic of my paper, which includes the whole topic of wilderness survival in California.

Andrews, Douglas and Vinson Brown. *The Pomo Indians of California and Their Neighbors.* Naturegraph Publishers, 1969.

This book covered the lives, culture, and survival techniques of the Pomo Indians of California. I found the book useful overall and used several areas of it for my research. However, it did not go into much depth. The book's topic was the same as my paper's.

Bliss-Wagner, Robin. Personal Interview. 18 April 2019.

The interview covered thoroughly the topic of wilderness survival. I found the information I gathered in the interview was helpful overall. I was able to use all the information for my research. The interview covered my topic of how to survive in the wilderness completely.

Brown, Tom and Brant Morgan. *Field Guide to Wilderness Survival.* Berkeley Books, 1983.

In this book, Tom Brown and Brant Morgan explore the practices and techniques of wilderness survival. I found the entire book very useful and used all the information in the book for my research. The book's topic is similar to my paper's, although my topic is more specific to wilderness survival in California. However, I was still able to relate the information in the book to my topic. Overall the book was very helpful.

Campbell, Paul. *Survival Skills of Native California.* Gibbs Smith, 1999.

In this book, Paul Campbell explores the survival skills of the Native Americans of California. His main topic is the way Native Americans survived in California. I found the entire book very helpful and used all the information in the book for my research. The book's topic is nearly identical to that of my paper's, except much more in-depth, and covering all the Native American tribes in California. This book was probably one of the most useful books I found on my topic.

"Making Arrowheads: The Ancient Art of Flint Knapping."*Alderleaf Wilderness College*, 2006, www.wildernesscollege.com/making-arrowheads.html. Accessed 19 April 2019.

This article explained how to flint knap stone into tools. This article was helpful because it showed me how to flint knap tools in a modern way, based off of Native American techniques. The article's topic covered only a section of my paper, which includes the whole topic of wilderness survival in California.

Neuwirth, Kathleen. Personal Interview. 24 March 2019.

The interview covered the topic of tracking. I found the interview useful for my research. The interview covered part of my paper's topic, but not all of it, as my topic is on the entire topic of wilderness survival in California.