

Abstract

The Fairfield Osborn Preserve has a series of trails designed for hiking access that are susceptible to degradation through natural processes such as erosion and sedimentation. The section of Moving Mountain Trail between Frog Heaven and Kelly Pond is of specific concern. In 2015, twenty new stairs and two drainage channels were installed on a particularly steep part of the trail. In March and April 2016, this section of Moving Mountain trail was studied for the effectiveness of water diversion efforts, the condition of the stairs and drainage channels, and recommendations for future efforts to help maintain this section of trail. The stairs were found to all be intact and in good condition, although there was noticeable deposition of sediments at the base of each stair. The drainage canals received substantial deposits of sediment since they were installed, and sections needed to be dug out to restore their full functionality. Recommendations were made for the installation of water bars to encourage runoff to follow the drainage canals as opposed to flowing down the stairs. Recommendations were also made to increase the presence of native riparian flora such as *Carex barbarae* (Basket Sedge) and *Juncus patens* (Common Rush) in order to further control erosion.



Background

Around the world, hiking trails are used by people for recreational exercise. These trails require constant attention and maintenance in order to keep everyone on them safe. Constant foot traffic, rain, overgrowth of plants and other variables all play a part in eroding away trails. At the Fairfield Osborn Preserve, one such trail had been heavily damaged by water. The trail is steep and all the sediment under the steps had been washed away. About a year ago, a group of Sonoma State University students replaced all the steps with new water bars to help slow water running down the trail and dug two drainage ditches that would help divert water off to the sides. We needed to determine how effective these new changes were during the rainy season and whether any other additions were needed to improve the trail further.

Fairfield Osborne Preserve Restoration Assessment



Methods

The methods We used included Measuring the steps depths and distances between each other during heavy rainfall. We also did a visual inspection of the drainage ditches. When we returned, we used saws and axes to cut branches for water bars. We used shovels to dig the pits.

Step number from the bottom of the hill	Number of feet that the stairs are spaced on 3/12/2016
157"	
245"	
321"	
434"	
545"	
6210"	
727"	
824"	
921.5"	
1029"	
1131.5"	
1244"	
1318"	This stair is diverting water into the first drainage ditch.
14210.5"	Little water flow to Step 13.
1527.5"	Little water flow to Step 13.
1633.5"	Little water flow to Step 13.
1716.5"	This is a railroad tie. Little water flow to Step 13.
1818"	This is a railroad tie. Little water flow to Step 13.
19271"	This is a railroad tie. Little water flow to Step 13.
Step 1 above 20 steps 1-19	Little water flow.
Step 2 above 21 steps 1-19	Little water flow into channel 1.
Step 3 above 22 steps 1-19	21" across (waterspand), 4" deep, water cutting into trail, running into diverted channel
Inserted water bar step on 23 4/8/16	We inserted 2 water bars to divert water
Inserted water 24 bar on 4/8/2016	We inserted 2 water bars to divert water

References:

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Results

The 20 steps the previous group installed did a good job slowing down the water. However, the drainage ditches, channelized and possibly sped up the diverted water. The bottom of the lower drainage ditch did not meet up with the trail below. However the water did reach the trail from the drainage ditch. We engineered and dug two pits at the lower end of each drainage ditch with a berm on the lower side. The berm included two railroad ties. With the pits and berms, the water will slow down. Additional work was done on the steps and two water bars were created uphill.



Future Work

Part of restoration work is a continuous process of maintenance. We recommend a seasonal check-up on the site to see how the features are being maintained. We also recommend planting native rushes and sedges around the site to help slow down water and prevent further erosion.



Conclusion

As land management interns we assess the restoration steps and drainage ditch during heavy rain conditions. We designed the addition of two water bars uphill from the trail to direct water away from creek to avoid erosion and soil deposition. Native plant restoration will limit erosion by slowing down speed of the water and capturing sediment. We recommend a seasonal observation of the trail for future maintenance.

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