

Restoration Design

Lab/Studio Design Assignment 6

Assigned 23 & 24 May 2007

Due 30 & 31 May 2007

Overview

Cascade Pass was one of the earliest heavily-used passages across the Cascade mountain range. At 1641 meters, it is along a route from the Stehekin River watershed (Lake Chelan) into the upper part of the Skagit River watershed. Native Americans used it, then settlers came. It became part of the Mount Baker Snoqualmie National Forest and was used for overnight camping starting in the 1920's. North Cascades National Park (NOCA) came into being in 1968; Cascade Pass, now part of NOCA, was closed to overnight camping but is still a popular day hike and is the access route to many backpacking trips.

Recreational use has caused extensive impacts to subalpine vegetation communities and soils. Both trampling and camping cause impacts such as reduced vegetation cover, reduced species diversity, changes in species composition, soil compaction and soil loss. These impacts further impair soil conditions and processes so that natural re-colonization by plants is extremely slow. The vegetation is dominated by woody *Phyllodoce* and *Vaccinium*, a community type that is made up of species that are neither tolerant of trampling impacts, nor particularly resilient. The Pass has heavy snow pack, which creates a short, 10-12 week growing season, further limiting regrowth.

A study done in 1970 found that there were 48 campsites and connecting trails within a 12 ha area. They had compacted, bare soil. As a consequence of this study, the park superintendent closed all camping and initiated a research and restoration program with the intention of finding out how to repair the damage, and then to repair it. Management recommendations included a call to actively revegetate the site using locally collected seed of plant species resistant to trampling (and likely to establish from seed). A 1979 revegetation study for the district emphasized the use of on-site transplants, as the technique had been very successful at lower elevations. Another study found, as others have, that aspect (the direction the slope faces) was a very important control on seeding success.

Ramsay in 2004 sowed seed of sedges, rushes, grasses and a common subalpine forb, *Polygonum bistortoides*. He prepared compacted sites by scarifying to 15 cm. Following seeding, sites were covered with excelsior mats. Treatments included weed-free soil, peat, and watering, in various combinations. A number of plots were left un-amended and un-seeded as a control.

Germination rates were low (14%) and were related to soil moisture. It was found that there was a threshold of dryness that killed seedlings, and the treatments that avoided this threshold, such as adding peat or frequent watering, showed the best revegetation success. Soil added treatments without watering were worse than no treatment. The highest germination occurred in plots that had the best soil moisture.

Your Assignment:

Cascade Pass has not changed much. It is still shot through with a system of trails and denuded campgrounds, even though it was closed to camping in 1972. The Pass is accessible by driving up the Cascade River road 37 km (23 mi) from Marblemount on the Skagit River. A forest road takes you to a trailhead, and then a trail to the pass takes you 6 km (3.7 mi) along a path that gains 550 m (1804 ft) of elevation. Any plants, seed, soil, amendments, geotextiles, excelsior mats, water, tools, or anything else goes in (and up) on your back. The site is also within a wilderness area, and so any actions taken must comply with provisions of the Wilderness Act.

The Superintendent of the park has decided that the area needs to be restored. There is Congressional funding for a contractor-provided project, and there is a provision for ongoing monitoring and maintenance within that funding package. Because the site is located in the Stephen Mather Wilderness Area, you will be limited to a maximum of 5 employees on the job site, but you may solicit and use volunteer labor on an approval-for-each-event basis.

This is a simple ecosystem that does not have much of a successional pathway. But it is in a stressful, disturbance-prone location with access problems and a short growing season. You will be trying to get plants to grow in small compacted campsites and along trails. Assume that the campsites are 5 ft by 10 ft, and that the impacted trails are 1.5 ft wide. You will need to stop the disturbance while allowing continued transit through the site by hikers.

The goal is to restore the site. **List what you think the functional requirements would be. What are the constraints?** The location is interesting because you do not know exactly when the snow cover will melt away in the spring, and you are out of business after it snows in the fall. So you need to create a schedule that minimizes the likelihood that you will not accomplish your work. **List your design parameters and specific implementation tasks. Determine precedence** (which must come before others, which must come after). **Estimate time (both labor hour or days and task duration)** to perform each task. **Create a flowchart or network diagram** that allows you to visualize which tasks logically group together, and allows you to see where interim deadlines need to be set. Because there are 48 campsites, you will probably restore only part of them during the first growing season, with others restored in subsequent seasons. **Draw a plan view sketch** of the network of sites, and **designate** which sites you will do the first season, which the second, etc. **Tell why** you have chosen the sequencing you are describing.

Checklists:

Design Parameter Related Questions

- What plants will you use?
- What forms (seed, container plants, etc.) will you install?
- What densities will you specify?
- Where will you get the plants or seeds?
- How will you treat the soil at the sites (scarification, mulch, soil)?
- How will you plant?
- When will you plant?
- How will you leave the site (mulch, mat, bare)?
- Will you water, fertilize?
- What is the total area you will restore?
- Given this, how many total plants or seeds will you use?

Design Documentation

- Draw a cross-section of a trail, and detail the soil treatments, mulch, excelsior mats, width of treatment, anchoring techniques.
- Repeat for a campsite.

Installation Logistics Questions

- What will you do to control human re-entry after you have installed the restoration features?
- Where will you keep materials and equipment?
- What about water for the plants?
- Where will people stay?
- What is your project schedule, what's on the critical path and where is there slack?
- What decisions have you made to lighten your load as you hike up the trail again and again?

Related web sites:

Alpine Lakes Wilderness

<http://www.fs.fed.us/r6/wenatchee/cle-elum-wilderness/why-wilderness.html>

Pratt Lake Wilderness

<http://www.wta.org/~wta/magazine/1185.pdf>

Sub-alpine restoration progress

<http://www.nps.gov/nwresearch/resto.html>

Cascade Pass

<http://www.nps.gov/noca/planyourvisit/cascade-pass-trail.htm>

Cascade Pass, Wikipedia

http://en.wikipedia.org/wiki/Cascade_Pass