



Replace Rim Village Barriers Revegetation Project

2018 Annual Report



**ON THIS PAGE**

Park visitors stroll across revegetation areas during the sensitive time when plants are emerging from the winter snowpack.
Photo by Jen Hooke.

ON THE COVER

Trampling impacts to vegetation and soils in an unfenced area by the Rim Village Café and Gifts building.
Photo by Jen Hooke.

Rim Village Barriers Revegetation Project

2018 Annual Report

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Abstract

The Replace Rim Village Barriers project corrects issues stemming from heavy visitor use in a revegetated area (former parking lot) at the west end of Rim Village in Crater Lake National Park. The goals of this project are to install a new fencing system; stabilize damaged portions of landscaping islands through revegetation; and create an interpretive wayside sharing the story of this restoration site with the public. Work completed during the 2018 field season includes finalizing a fencing design, procuring fencing, and installing in-ground post receivers; collecting 1,158 g of native seed and propagating 1,162 native plants for restoration outplantings; and creating and procuring a wayside panel. In 2019 the new barriers will be installed, revegetation work completed, and the wayside panel installed. Fencing design and revegetation methods used in this project may be expanded to other areas within the Rim Village Historic District as appropriate.

Acknowledgments

This project was funded by the National Park Service Recreation Fee program. Crater Lake National Park Botany staff including Melody Frederic, Kaylin Scott, Thomas Hender, Delacey Randall, Hamilton Hasty, J.C. McNelly, and Alissa Iverson assisted with seed collection, plant propagation, and installation of in-ground post receivers. Mike Stone of the Crater Lake National Park Maintenance division provided technical assistance and recommendations related to fencing materials. Marsha McCabe and Mimi Gorman helped with development of the interpretive wayside. Sean Denniston, Susan Dolan, Jennifer Gifford, Steve Mark, Sean Mohren, Carrie Toepper, and Corrina Welzenbach provided input on fencing design.

Introduction

Rim Village is the most heavily visited site in Crater Lake National Park (CRLA). It serves as a focal point for visitor services and is often the first viewing opportunity of Crater Lake for visitors arriving from the south. Rim Village has been actively used by Park visitors since the Park's inception in 1902, and is rich in cultural and natural resources. The 32-acre Rim Village Historic District was listed on the National Register of Historic Places in 1997. Beginning in 2005, a large parking lot at the western end of Rim Village (Figure 1) was relocated away from the caldera edge to behind (south of) the 1928 building (old cafeteria building) and a new Rim Village Café and Gifts building was erected. The old parking lot was removed, new walkways delineated, and landscaping islands were created and planted/seeded with native plant materials. In 2009, the landscaping islands were planted with whitebark pine seedlings sourced from blister rust-resistant whitebark pine trees within the Park. This whitebark pine restoration planting has since become the most successful one in the Park and arguably the Pacific Northwest. The landscaping islands in the former parking lot area have been fenced since revegetation efforts began in 2006 to protect establishing vegetation from heavy visitor use and foot traffic. Fencing has been effective at protecting vegetation at this site, with nearby unfenced areas experiencing heavy trampling that has depleted vegetation cover.



Figure 1. The former parking lot in front of the cafeteria building (now called the 1928 building) at the western end of Rim Village. Photo courtesy of the Crater Lake National Park Museum & Archives Collection.

Prior to the inception of the Replace Rim Village Barriers project, fencing of the landscaping islands at the former parking lot site consisted of plastic posts slipped over rebar stakes that were installed each spring at snowmelt. When the former parking lot was removed, site preparation by the



Figure 2. The old fencing was prone to leaning and/or falling over, as it was lightweight and easily dislodged, and its rebar stake supports were difficult to install in the compacted ground. Photo by Carrie Wyler.

contractors was minimal prior to revegetating the site, resulting in heavy soil compaction in the landscaping islands (Hudson and Thomas 2010). Installing rebar stakes into hard, compacted ground each spring was difficult, and the fencing tended to lean and become unstable as a result (Figure 2). This projected an unkempt and neglected appearance at one of the Park's most heavily visited locales. A need existed for a more durable and attractive fencing option to protect the vegetation and whitebark pine seedlings within the landscaping islands.

Additionally, inconsistent fencing over the years (e.g., some islands were not fenced in certain years or were never fenced) including fencing being removed once the vegetation was at peak flowering contributed to many social trails and barren areas within the landscaping islands.

The goals of the Replace Rim Village Barriers project are three fold:

- 1) Replace the current deteriorated fencing at Rim Village with a new fencing design that is sturdy, durable, and compatible with cultural resource values in the Rim Village Historic District.
- 2) Stabilize vegetation in areas that have been damaged by heavy visitor use through revegetation of social trails and barren or sparsely vegetated areas.
- 3) Share the story of this restoration project with Park visitors through the creation of an interpretive wayside display.

Methods

The Replace Rim Village Barriers project is comprised of three main efforts: 1) new fencing design, 2) revegetation, and 3) interpretation. Each component is discussed separately below.

New Fencing Design

There were several criteria that needed consideration when developing a new fencing scheme. First, the fencing had to be compatible with the nature and feel of the Rim Village Historic District. An interdisciplinary group of CRLA employees and NPS regional staff with cultural landscape expertise assisted with developing a general fencing design. It was agreed that fence posts would consist of simple wrought iron balusters with decorative twists. Each post would be topped with an eyelet that would support a length of metal chain threaded through the eyelets to serve as a barrier. Secondly, the fencing needed to be removable to provide for Park visitor and employee safety. In the winter and spring, the area to be fenced is covered with a layer of deep, packed snow (Figure 3) where Park visitors freely wander and play. If a fence was left in place over the winter, it would likely become damaged by the weight and shifting nature of the snowpack and could also come into contact with visitors while partially buried, posing a safety hazard. To ensure the stability of fencing posts, it was determined that in-ground post receivers were necessary to support posts and facilitate installation each spring.



Figure 3. The former parking lot area in summer/fall (left) with walking paths delineated; and in winter/spring (right) when visitors wander freely across the area. Photos by Carrie Wyler.

Materials

Information on suppliers, product numbers, order specifications, etc. is on file in the Botany office at Park headquarters. The fencing posts used in this project are composed of a decorative $\frac{3}{4}$ " square "wrought iron" (actually hot-rolled mild steel) baluster, topped with a welded-on ring cut from $\frac{1}{4}$ " steel plate. The balusters are 45.5" long, solid $\frac{3}{4}$ ", smooth finish, with a custom spacing for the placement of the twist (Figure 4). The placement of the twist was adjusted so as to be centered when the posts are placed 15" into the ground. The overall length of the post was the maximum offered by

the supplier, and the resulting 30.5" above-ground height provides a balance between forming an effective barrier without being visually intrusive.

Fabrication of rings for the tops of the posts and the service of welding were sourced locally. Considerations in the design of the rings were to allow a 1" chain to pass through the center; to eliminate water-trapping areas and allow a stronger weld by flaring the bottom of the rings to span the width of the posts; and to create a compact, clean profile by squaring the wall thickness with the depth ($\frac{1}{4}$ "). The placement of the ring on top of the post, as opposed to the side, allows for more compact storage, and minimizes damage from striking other posts during installation/removal and storage. To create the rings, a file was drawn in Microsoft Paint to be used as a reference for a Computer Numerical Control (CNC) plasma cutter (Figure 4). The rings were cut out of $\frac{1}{4}$ " steel plate. In sourcing the welding of rings to posts, it was specified that the welds should be cleaned and dressed to provide a smooth, concave surface, free of slag and spatter.

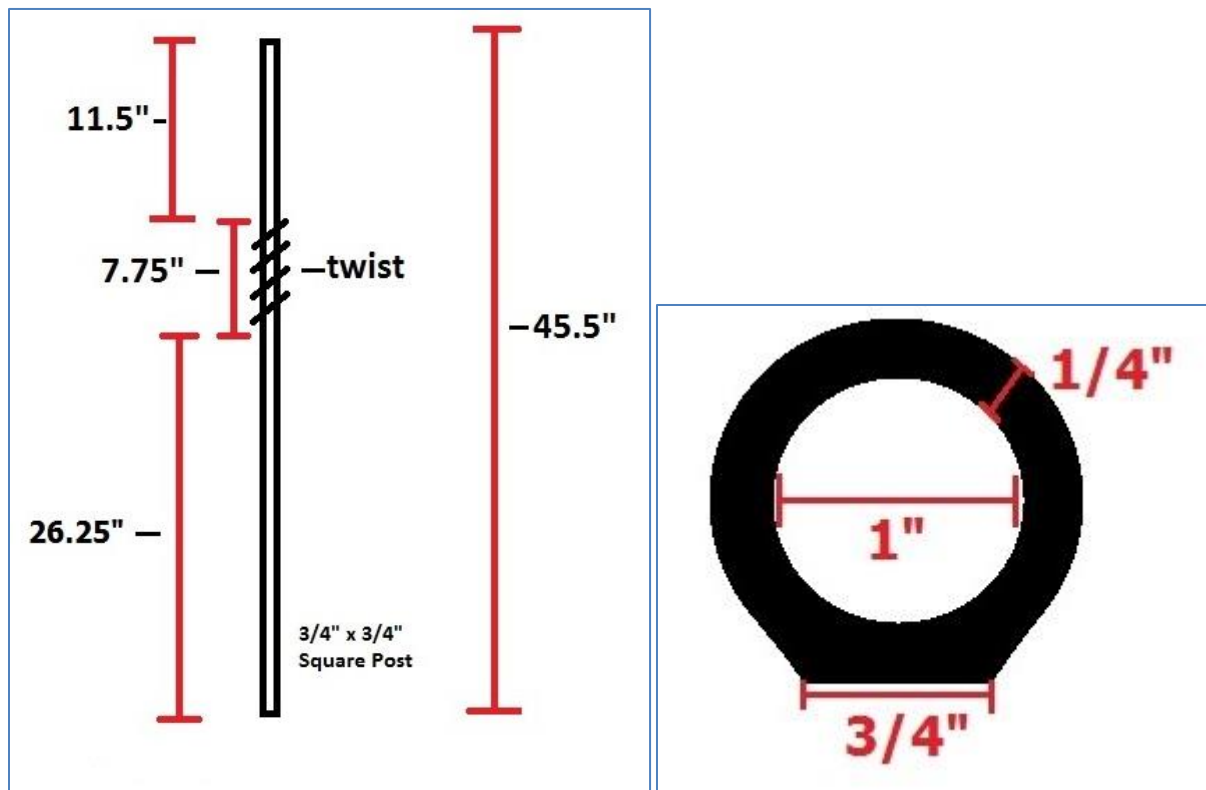


Figure 4. Specifications for manufacturing posts (left) and rings (right) to serve as fence posts in the Rim Village barriers project. Drawings by Scott Heisler.

The welded posts were powder coated to provide both corrosion resistance and an aesthetically pleasing finish. Powder coating, rather than painting, was chosen as a finish due to its longer service life, greater durability against chips and scratches, non-volatile organic compounds (VOC) purchasing status, and reducing CRLA employee exposure to hazardous chemicals. The coating used was Cardinal brand "Black Superdurable 20% Gloss" superdurable triglycidyl isocyanurate (TGIC) polyester, and the posts received two coats (industry standard). This coating was chosen as it

provides enhanced resistance to ultraviolet (UV) photodegradation. Surface preparation prior to powder coating consisted of sand blasting (industry standard), and limited cleaning of lower-quality welds.

Since the fencing design had to be removable, it was decided to use receivers to secure posts to facilitate easy installation and removal each year. The in-ground post receivers for the fence posts are 18" x 1" National Pipe Thread (NPT) threaded "black iron" pipe nipples. Threaded pipe nipples were selected due to their durability, market availability, ability to drain collected water, ability to accept a durable cap when not in use, and their facilitation of non-damaging installation by utilizing the pipe threads. The rounded corners on the posts allow them to fit inside the 1" diameter pipes (the diagonal of a perfect $\frac{3}{4}$ " square is 1.06"), and leaves minimal room for the posts to wobble. The 18" length of the pipe nipples was selected as the closest available fit to the desired 16.5" length.

The pipe nipples received a powder coat finish (Figure 5) to provide corrosion resistance and an



Figure 5. Fence posts (top, middle) and receiver (bottom right) after powder coating. Photo by Scott Heisler.

aesthetically pleasing finish. The coating applied was a double coat of Cardinal brand "Black 20% Gloss" TGIC polyester, with a surface-preparation of sand blasting. The threads of the pipes were coated without affecting their usability.

The caps for the in-ground post receivers are 1" "black iron" threaded pipe caps. These caps were selected based on their durability and resistance to incidental removal while in service. Covering the open end of the receivers while they are not in use prevents them from filling with debris and water. When the caps were received, they were found to have "CHINA" stamped on their ends. To provide an image more in line with the Rim Village Historic District standards, this lettering was removed by grinding with an angle grinder.

The caps received a paint finish, applied by CRLA Botany staff. Painting was chosen as an acceptable finish for the caps due to their low-visibility while in service and simplicity of upkeep. Surface preparation for painting consisted of removing oil residue with acetone. The paint coating consists of a single coat of Rust-Oleum brand “Stops Rust Clean Metal Primer,” and a double coat of Rust-Oleum brand “Stops Rust Protective Enamel” in flat black color. The paint was applied using a high-pressure low-volume (HPLV) paint sprayer, allowing the use of low-VOC paint (Figure 6).

The fence chain selected for the project is Everbilt brand #2/0 “Decorative Chain” in black, consisting of 0.9”W x 1.5”L links of 00 gage wire. It is hoped that the weight of this chain will provide enough strength to resist breakage from visitor manipulation, while minimizing visual impact. The chain ends are tied together with screw-links of a size and color matching the chain. The chain and screw-links were factory powder coated.



Figure 6. Painting caps for fence post receivers. Photo by Carrie Wyler.

Installation

Installation of the in-ground post receivers was a critical step in providing a functional, aesthetically pleasing product, and this occurred in October of 2018. The receivers needed to be uniformly spaced and aligned along the walkways, set plumb vertical, not be set too deeply or shallowly, and be cleaned of any obstructing dirt that was packed inside the pipe nipples while setting. Installation points were uniformly spaced through use of a measuring wheel, and aligned by sight comparison with adjoining points. A rotary hammer drill equipped with a bulls-eye level and 1.25” x 18” masonry bit (the exterior dimensions of the pipe nipples) provided a plumb, cleanly cut, and non-collapsing hole for placement of the receivers, regardless of the ground conditions (soil type, presence of rocks or cement/asphalt debris) (Figure 8). When excessively sandy soil was encountered, a few ounces of water were poured into the hole while drilling to aid in retaining the structure of the borehole. To set the pipe nipples into the boreholes, a designated installation cap was screwed onto the thread of pipes, and the pipes were tapped into place by striking the cap (Figure 7). A length of 3/4” rebar was then placed inside the pipes and used to ram out any obstructing dirt. The depth that a post would sit at inside of the installed pipes was then measured, and adjusted to 15”

below-ground by the addition of pumice sand (Figure 7). To prepare the newly installed receivers for winter, caps were threaded onto the exposed threads of each pipe nipple. The threads of these caps were treated with oil to prevent seizing, and it is recommended that a coating of oil is applied annually during installation.

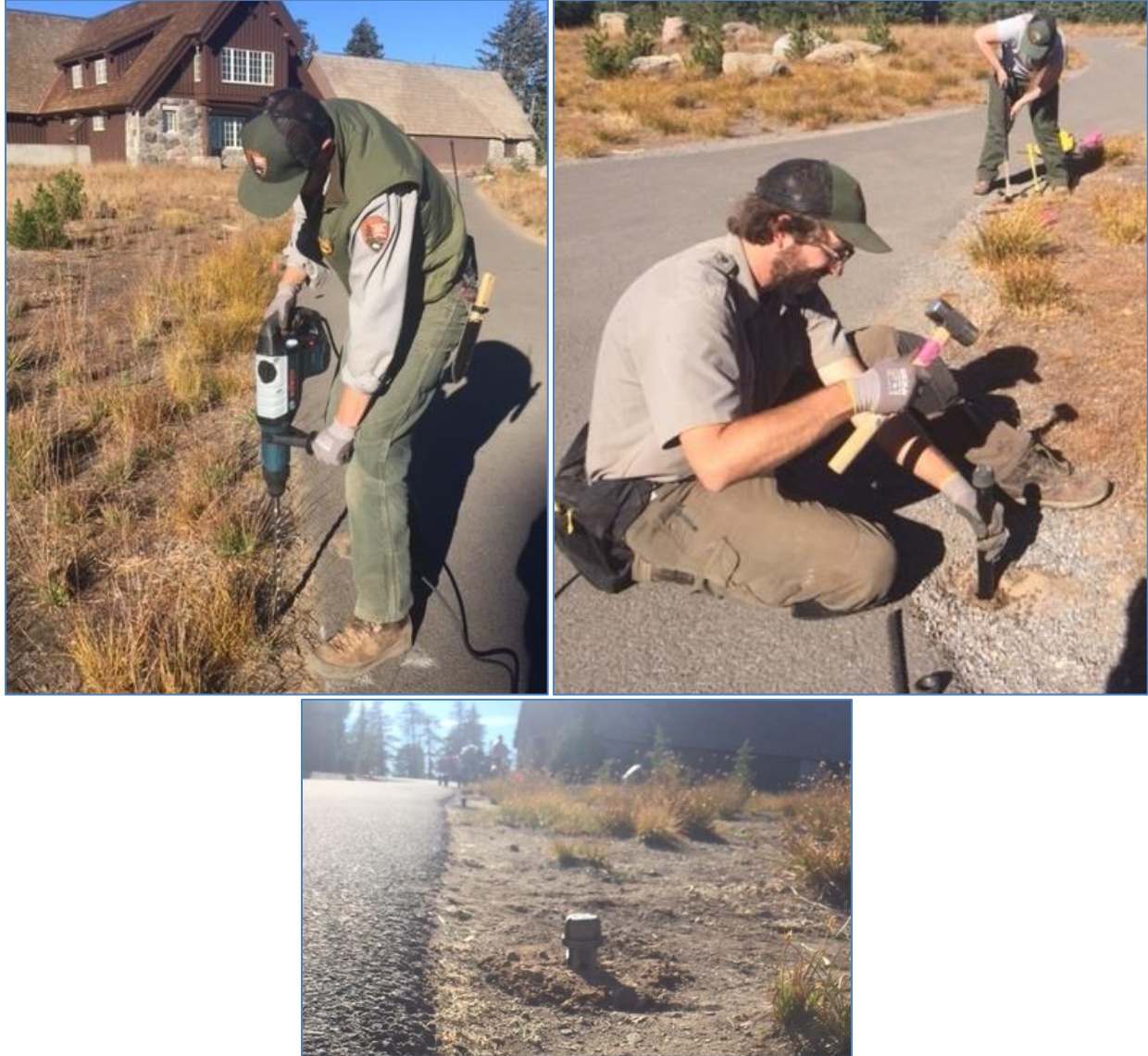


Figure 7. Top left: Drilling a borehole during installation of the in-ground post receivers. Top right: Installation of the in-ground post receivers: insertion of a pipe nipple into a borehole (foreground); checking the level at which a post sits inside a receiver (background). Bottom: Installed in-ground post receiver, with a cap screwed on for protection while not in use. Photos by Carrie Wyler.

During installation, it was found that some of the pipe nipples had a small lip on the inside edge of their opening, likely an artifact of the manufacturing process. These irregularities, in combination with variations in the thickness of the powder coating applied on the posts, were prominent enough in

a few cases to prevent a post from being inserted. To remedy this, a metalworking countersink bit was used to ream the opening of the installed receiver, using a heavy-duty gas engine drill.

The new fencing design will be installed for the first time during the spring of 2019 as the snow recedes and exposes the in-ground post receivers.

Revegetation

This project will restore and revegetate areas within the landscaping islands that have been impacted by heavy visitor use (Figure 8). The focus of revegetation is limited to damaged areas with little or no vegetation cover, including social trails and trampled areas. During the initial revegetation of the former parking lot area in 2006—2007, a variety of plant species were planted and seeded in the landscaping islands. Perhaps owing to the heavily compacted soil, there was high mortality of planted species and the area became dominated by the hardy grass California brome (*Bromus carinatus* var. *carinatus*). A plant species list was developed during the 2018 summer that reflected a more diverse vegetation community more closely aligned with the intention of the original landscape design:

“In looking at other areas of the park, Merel Sager found a landscape that matched his vision for the barren site at Rim Village in Sun Notch, a verdant swale of meadow grasses and wildflowers situated east of Garfield Peak. Transposing this verdant appearance to Rim Village would satisfy Sager’s plan in two ways: first, the area would be “improved” by the addition of new plants and the diminishing of the “dust evil” that was prevalent at the site; second, and perhaps more importantly, the landscape at the rim would be “restored” to its original, lush appearance (NPS 2004, pg. 29).”

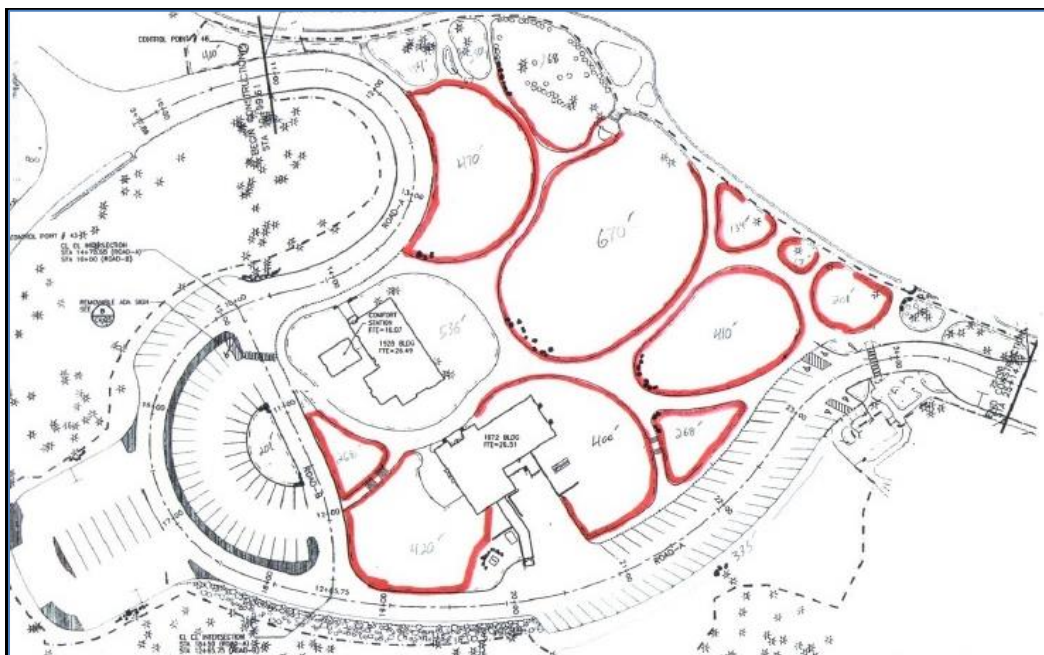


Figure 8. Landscaping islands outlined in red will be addressed by this project.

A plant species list for revegetation efforts was created in the summer of 2018 (Table 1). Species were included on this list based on: 1) they were found growing abundantly in natural vegetation communities surrounding Rim Village and 2) they were components of meadow vegetation as envisioned by the original landscape designers. The seed collection area was set at one half mile from Rim Village. Plant phenology was monitored throughout the growing season to ensure ripe seed was not missed. Seed was collected according to the Botany program's established Seed Collection Protocols (Beck et al. 2017). This seed was then dried and cleaned according to the Botany program's Seed Cleaning and Short Term Storage Protocol (on file on the Botany server). Limited collections of individual species were set aside during collection and processing for use in plant propagation. The remaining seed was stored in the Botany seed freezer for use in fall 2019 broadcast seeding efforts.

Table 1. Plant species list for stabilizing the damaged landscape within the Replace Rim Village Barriers project area.

Scientific Name	Common Name
<i>Achillea millefolium</i>	Yarrow
<i>Achnatherum occidentale</i>	California needlegrass
<i>Aconogonon davisiae</i> var. <i>davisiae</i>	Fleeceflower
<i>Agoseris aurantiaca</i> var. <i>aurantiaca</i>	Orange agoseris
<i>Anaphalis margaritacea</i>	Pearly everlasting
<i>Antennaria</i> species	Pussytoes
<i>Aquilegia formosa</i>	Red columbine
<i>Boechera howellii</i>	Flatseed rockcress
<i>Calyptridium umbellatum</i>	Pussypaws
<i>Carex pachycarpa</i>	Many-rib sedge
<i>Castilleja applegatei</i>	Applegate's paintbrush
<i>Castilleja arachnoidea</i>	Cobwebby paintbrush
<i>Chamerion angustifolium</i>	Fireweed
<i>Elymus elymoides</i> ssp. <i>elymoides</i>	Squirreltail
<i>Ericameria greenei</i>	Greene's goldenweed
<i>Eriogonum marifolium</i> var. <i>marifolium</i>	Sierra eriogonum
<i>Eriogonum pyrolifolium</i>	Alpine buckwheat
<i>Eucephalus ledophyllus</i>	Cascade aster
<i>Hieracium albiflorum</i>	White flowering hawkweed
<i>Holodiscus microphyllus</i>	Ocean spray
<i>Juncus parryi</i>	Parry's rush
<i>Lupinus andersonii</i>	Anderson's lupine
<i>Lupinus lepidus</i> var. <i>lobbii</i>	Prostrate lupine
<i>Penstemon rydbergii</i> var. <i>oreocharis</i>	Rydberg's penstemon
<i>Phacelia hastata</i> ssp. <i>compacta</i>	Silverleaf phacelia
<i>Phlox diffusa</i>	Spreading phlox
<i>Polygonum shastense</i>	Shasta knotweed
<i>Spiraea spendens</i>	Subalpine spirea
<i>Trifolium longipes</i> var. <i>hansenii</i>	Hansen's clover

The plant species selected for propagation were ones that the Botany program has experienced the most success with propagating and planting in prior restoration projects. These plant species are:

- *Achillea millefolium*
- *Achnatherum occidentale*
- *Boechera howellii*
- *Carex pachycarpa*
- *Chamerion angustifolium*
- *Ericameria greenei*
- *Penstemon rydbergii* var. *oreocharis*
- *Phacelia hastata* ssp. *compacta*
- *Phlox diffusa*

In October of 2018, Ray Leach “SC7 Cone-tainer” pots were placed in racks and then filled and settled to 0.5” below the top rim with Premier “PRO-MIX HP Mycorrhizae” soil. These pots were then seeded with a small pinch of native seeds collected from the restoration area during the 2018 field season. A thin (~1/8”) layer of soil was then placed over the seeds, and the pots were watered.

The seeded pots were placed under rodent-excluding screens (Figure 9) in the Botany program’s space at the Ball Diamond at Park headquarters, and left to overwinter under the snowpack to replicate natural germination conditions. Prior to overwintering, pots were placed in a tight group, and mulch was packed around the perimeter to protect roots from exposure to severe cold and desiccation.

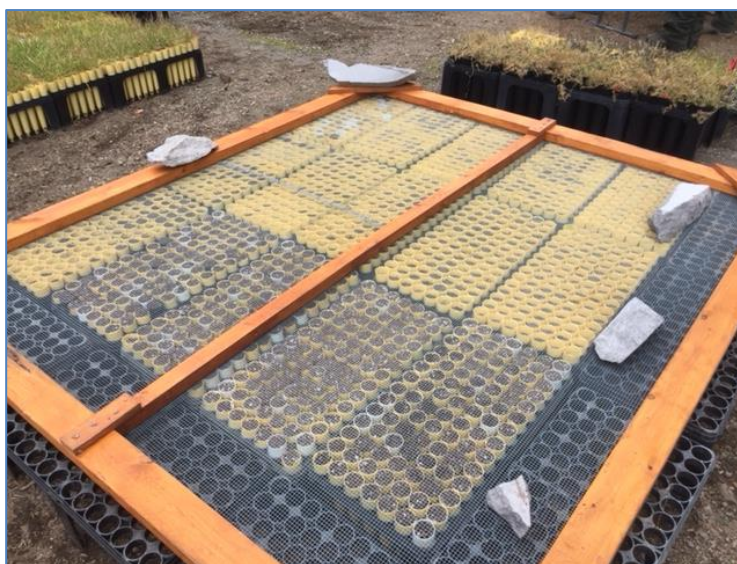


Figure 9. Seeded pots protected from predation by rodent-excluding screens. Photo by Carrie Wyler.

Interpretation

In order to tell the story of how a parking lot was transformed into a meadow with islands of rust-resistant whitebark pine, a new interpretive wayside was created for installation in the landscaping island area. This sign was designed through a collaborative effort between CRLA Botany and Interpretation staffs. The background artwork for the wayside is an original design painted by Tara Chizinski. The wayside was created according to NPS specifications that dictate font type, size, spacing, and content available through the NPS Harper’s Ferry website:

<https://www.nps.gov/subjects/hfc/index.htm>. The sign panels and sign base were purchased from Pannier Graphics, whose representatives helped with determining an appropriate panel material and frame design for the project’s needs. The wayside was intended to be a low profile, cantilevered

design that is compliant with the Americans with Disabilities Act and the Architectural Barriers Act, and mounted on a removable metal stand that fits into sleeves mounted in the ground. Placement of the wayside will be made after consulting with the Park Historian. It is hoped that the wayside can be placed between the Rim Village Café and Gifts building and the Promenade.

Results

New Fencing Design

The new fencing posts and chain (Figure 10) were procured and in-ground post receivers installed in October of 2018. The new fencing will extend 3,576' to protect the landscaping islands outlined in red in Figure 10. The fencing materials are currently being stored at the South Yard. Installation will begin as the snow melts in June of 2019. An assessment of the in-ground post receiver positions will also be made during installation to determine impacts of frost-heaving and overwintering. Any receivers that were frost-heaved will be lowered to an appropriate height to avoid tripping hazards.



Figure 10. The new fence posts and chain for the Replace Rim Village Barriers project. Photo by Carrie Wyler.

Revegetation

A total of 1,158 grams of rough-cleaned seed were collected during the 2018 field season from 12 species (plus one mixed-species collection – Table 2). Over 1,160 pots were seeded for plant propagation efforts, with a target of 1,000 plants surviving for restoration outplanting efforts (Table 2).

Table 2. Seed collection weights and plant propagation numbers by species from the 2018 seed collection efforts.

Scientific Name	Seed Collected (g)	Plants Propagated (#)
<i>Achillea millefolium</i>	35	168
<i>Achnatherum occidentale</i>	8	77
<i>Boechera howellii</i>	5	98
<i>Bromus carinatus</i> var. <i>carinatus</i>	195	0
<i>Carex pachycarpa</i>	280	56
<i>Castilleja</i> species	61	0
<i>Chamerion angustifolium</i>	74	238
<i>Ericameria greenei</i>	14	56
<i>Eriogonum</i> species	280	0
<i>Lupinus lepidus</i> var. <i>lobbii</i>	18	0
<i>Penstemon rydbergii</i> var. <i>oreocharis</i>	119	392
<i>Phacelia hastata</i> ssp. <i>compacta</i>	2	56
<i>Phlox diffusa</i>	2	21
Mixed species	65	0
Total	1,158	1,162

Plant propagation success will be evaluated during the 2019 field season, and plant health and status will be monitored. Plants will be outplanted in the fall of 2019 into barren and sparsely vegetated portions of the landscaping island area.

Interpretation

The final wayside created has dimensions of 48” wide by 20” high. These dimensions match those of other wayside panels along the stone wall of the Rim Village Promenade. Figure 11 shows the final design of the sign panel.

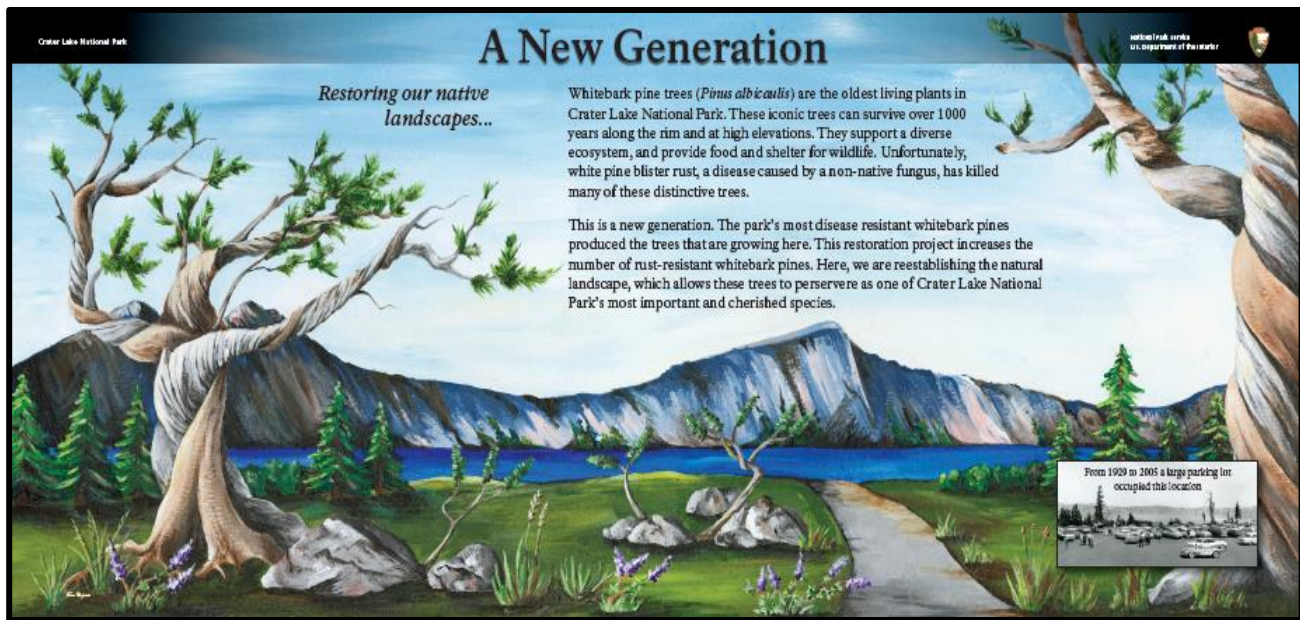


Figure 11. The new interpretive wayside to be installed in the landscaping island area in June of 2019.

Discussion

Several components of the Replace Rim Village Barriers project were completed during the 2018 field season, including procuring fencing materials, installing in-ground post receivers, creating and receiving the interpretive wayside, and collecting seed and propagating plants for landscape stabilization. The new fence will be installed in the spring of 2019, and the wayside will hopefully be installed soon afterwards. Seed collection will continue into the 2019 field season, and outplanting and broadcast seeding will occur in fall 2019 to rehabilitate damaged areas of the landscape.

This project presented the opportunity to step outside the Botany program's traditional areas of expertise, and required an atypical level of research into materials, industry methods/practices, and sourcing. As an aid for future projects requiring extensive open-market sourcing, some helpful recommendations can be gained from our experience. It behooves the purchaser to be well informed on market practices and prices before approaching a selected vendor with a request. When making large purchases outside the program's area of expertise, it is worth completing a government purchasing request "market research report" even if one is not required. The remoteness of the park often requires the purchasing of materials sight-unseen, often with long delivery times, and planning to procure a complete, tested prototype before proceeding with a final plan can prove an invaluable due-diligence measure.

If additional posts are purchased in the future, a number of modifications to sourcing may reduce costs, speed up procurement, and improve the quality of the product. If it is possible to have the completed posts sourced from a single vendor, this would be highly desirable. Shipping and transferring of the posts is quite expensive and time consuming. Single vendor sourcing might also

reduce the base cost of production, and result in a more refined end product. An ideal vendor for future fencing materials would have CNC water-jet cutting, welding, and powder coating capability. Additionally, use of CNC water-jet cutting, as opposed to plasma arc cutting, would be preferred, as it produces cleaner cuts. It is highly recommended to avoid future use of the vendor utilized for sourcing the rings and welding in this project. If chipping of the powder coating on the existing posts presents as a problem in the early use of the fence, coating future posts with a regular TGIC polyester, as opposed to a superdurable variant, could be tried. Superdurable TGIC polyesters provide a slightly lower level of chip resistance, but resist color fading and chalking under extended UV exposure.

The initial installation of the in-ground post receivers was completed during the 2018 field season, but a level of troubleshooting is expected when the fence is fully assembled in spring 2019. The effects of overwintering on the post receivers will need to be assessed, and some may need to be reinstalled. The receivers should be checked to ensure that they are plumb, and that the posts sit in them at the correct level. Removal of the receivers can be accomplished by installing a cap, and using the lower lip of the cap as a lever-point (Figure 12). Due to manufacturing variations in the opening size of the receivers and in the powder coating thickness on the posts, incompatible fit



Figure 12. Using a cap as a lever point to remove a post receiver. Photo by Carrie Wyler.

combinations may be encountered. If a lack of fit is found with an individual posts/receiver combination, it is suggested to try a different combination. If the problem is commonly encountered, a possible remedy is to lightly grind down two adjacent corner edges on one of the section of the posts which are contained by the receivers (approximately the bottom 16.5"). This grinding is best accomplished using either a light application of an electric angle grinder, or a mill file. The use of water to solidify the borehole walls during installation of the receivers occasionally resulted in deposits of mud adhered to the

internal walls of the pipes. If these residues are found to complicate insertion of the posts, careful use of a modified (cutting head has been ground down) 1" x 18" round shank masonry drill bit or pipe brush may be able to clear the obstruction. Water may also be used to clean out the caked dirt.

Fenced areas should be planted in fall 2019 with propagated forb plant species to add plant cover, color, and plant diversity to sparsely vegetated areas. Seed from forb species should be collected throughout 2019 for dispersal in fall 2019 or for more plant propagation. Areas that have been extremely trampled (barren) and are now fenced should be planted with sedge and grass species to

fill in the areas and get plant cover established. As these areas recover, forb species should be added to diversify the species in the area and to add color. Invasive plant species should continue to be monitored and controlled in the area, with a focus on the fenced islands. Red sandspurry (*Spergularia rubra*) has encroached on the edges of the landscaping islands closest to the sidewalks and needs treatment as it outcompetes restoration outplantings and native plants sprouting from broadcast seeding efforts.

The new wayside sign will need to be installed in the spring of 2019, and its location approved by the CRLA Historian and Management Team. The sleeves need to be installed in the ground by pouring concrete around them to keep them secure, which will require consultation with and assistance from the Maintenance division. Further instructions for installing the sign and putting the frame together can be found online on the Pannier Graphics website (<http://panniergraphics.com/>) under the consumer tools tab, then installation instructions. The sign will need to be removed from the sleeves each winter and replaced in the spring. The sleeves will need covering with caps each winter in order to prevent debris from accumulating inside.

The landscaping islands immediately adjacent to the 1928 Building were not addressed by fencing or revegetation efforts in this project. This is because this building is slated for conversion into the Park's new visitor center. Since the new visitor center design and construction is pending, no efforts were made to protect the vegetation within the proposed construction zone.

While the Replace Rim Village Barriers project will help repair trampling damage and protect vegetation in the landscaping islands within the former parking lot footprint, there is a strong need to rehabilitate the entire Rim Village Historic District. Many years of heavy visitor use and insufficient landscape maintenance have left the cultural landscape in poor condition. Preparation of a new Rim Village Cultural Landscape Report has been proposed and, if funded, would guide a holistic effort to rehabilitate the entire Rim Village Historic District. The fencing design and revegetation methods used in this project may be expanded to protect and restore other areas of Rim Village as appropriate.

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