

Evaluation Report: UNR: Great Basin Institute

Great Basin Institute - Nevada Conservation Corps - Evaluation Report 2019-2020

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Introduction

The Great Basin Institute is an interdisciplinary field studies organization that promotes environmental research, education, and conservation throughout the West. Founded in 1998 at the University of Nevada, GBI advances applied research to support science-based adaptive management of public lands. Celebrating its 22nd year of operation, GBI employs over 600 researchers and field technicians to support conservation initiatives. The Nevada Conservation Corps (NCC), a program of GBI, is an environmental service program dedicated to promoting field research and direct conservation service. NCC has administered 20 continuous AmeriCorps program years. The Corps supports Nevada's communities and public lands through the deployment of forestry teams to mitigate fire threats, reduce the spread of invasive species, and restore and re-designate trails. NCC's trained monitoring and assessment teams capture critical data on the condition of forest and rangeland health.

NCC's program activities include crew-based services that reduce wildland fire threat through fuels reduction and habitat restoration. In addition to such services, Corps members treat and abate noxious weeds, as well perform tasks such as post-fire re-seeding and native plant re-introduction. Trail management measures, including the designation and restoration of trail routes, also support reduction of fire threat by reducing fuels along trail corridors, maintaining fuel breaks, and offering improved access to fire locations. To support agency decision-making, NCC's Assessment, Inventory, and Monitoring teams evaluate and characterize forest and range health conditions and provide data to determine restoration efficacy. The primary anticipated short-term outcomes targeted by NCC program activities include reducing the risk of catastrophic wildfire; increasing accessibility and safe condition of usable recreational trail systems; and completing deliverables on datasets and monitoring protocols.

GBI contracted with the Center for Program Evaluation at the University of Nevada, Reno to design and evaluate the NCC program in the 2018-2021 grant cycle. This report describes the results of years 1 and 2 (2019 and 2020) of an impact evaluation for GBI's NCC. The goal of the evaluation is to evaluate the impact and efficacy of wildfire fuels reduction on reducing wildfire risk for Nevada's public lands. Silvicultural treatments included second entry of mastication and chaining treatment units aimed to create within-stand heterogeneity of various gaps, canopy layers, and densities while also reducing fuels through stand level thinning practices (Reinhardt et al. 2008; USDA-USDI 2014). Across treatments, large trees were favored for retention to promote increases in average stem diameters across all species. Resilience is maintained by ensuring a diversity of species, sizes, and age classes that can respond favorably to the range of potential disturbances (Stephens et al. 2009; Fule' et al. 2012).

Methods

Research Question. For the impact evaluation, a pre-post quasi-experimental design (QED) study was conducted with a matched comparison group to answer the research question: *Did Nevada Conservation Corps fuels reduction treatments improve fire regime condition class and therefore reduce wildfire risk for Nevada’s public lands compared to similar sites where fuels were not treated?*

Study Design. A QED was chosen because random selection of treatment sites was not feasible since projects and locations are determined by the needs of project partners. The QED will compared mean changes in fire regime condition class (FRCC) from pre-treatment to post-treatment for project sites and for untreated comparison sites. A FRCC is a classification of the amount of departure from the natural fuels regime (reference Attachment B). The three classes are based on low (FRCC 1), moderate (FRCC 2), and high (FRCC 3) departure from the central tendency of the natural (historical) regime. Low departure is considered to be within the natural (historical) range of variability, while moderate and high departures are outside. A higher FRCC indicates greater departure from the natural regime, and higher risk for catastrophic wildfire.

Sampling methods and sample size. To achieve adequate sample size, staff from CPE utilized G*Power3.1 statistical software to conduct a priori power analysis using a two-tailed independent sample t-test. A total sample size of 210 (105 treatment sites and 105 comparison sites) was determined to be sufficient. The program planned to sample at least 35 treatment and 35 comparison sites during each collection period. Data were collected at three time points, with 105 treatment and 105 comparison sites for a total of 210 samples (Table 1).

Table 1

Number of treatment and comparison sites by sample year

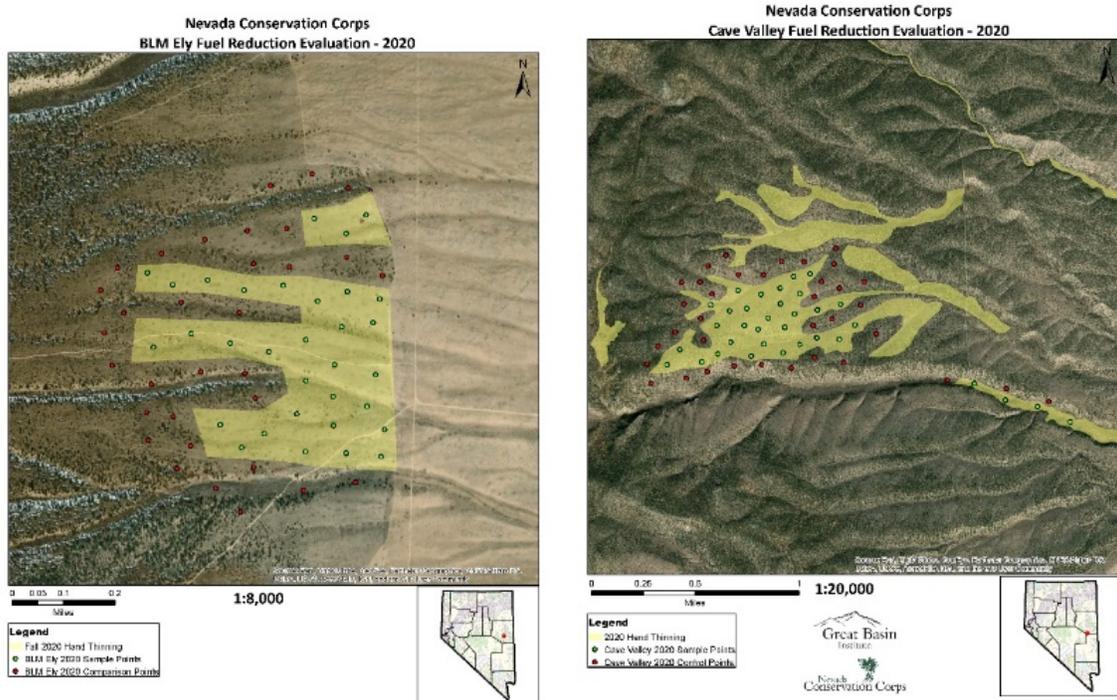
Sample Year	Number of Treatment Sites	Number of Comparison Sites
2019	35	35
2020_a	35	35
2020_b	35	35
Total	105	105

To establish FRCC for each sample site, GBI characterized the fuel load conditions in treatment and comparison sites using the Fuel Load Sample Method, also known as the Brown’s Planar Intercept Method (<https://www.fs.usda.gov/treearch/pubs/24059>). This method is commonly used in forestry to assess fuel load and establish ratings for FRCC and fire risk. The number and location of samples per project site was determined by the total acreage of the project site and proposed fuels reduction treatments. Comparison sites were selected according to the following criteria: slope aspect, plant species, and plant density. In order to collect fuel load data, GPS units were used to archive sample site locations, digital cameras were used to photo document each

sample site, transect tape was used to establish transect lines, and clinometer were used to measure slope. Figures 1 and 2 show the treatment and comparison sites for two 2020 locations.

Fuel Load Data Analysis. After fuel load data were collected for treatment and comparison sites, NCC agency project partners reviewed the fuel load data and photo points to assess and assign the FRCC for the sample sites pre- and post-treatment. GBI submitted the FRCC data to CPE for analysis.

Figures 1 and 2. 2020 Fuel Load Treatment and Comparison Sample Sites



Results

An ANCOVA was calculated to determine the effect of the treatment on post-intervention Fire Regime Condition Class after controlling for pre-intervention Fire Regime Condition Class. After adjustment for pre-treatment Fire Regime Condition Class, there was a statistically significant difference in mean post-treatment Fire Regime Condition Class between the treatment and comparison sites, $F(1, 207) = 83.4, p < .001, \text{partial } \eta^2 = .287$. Mean post-intervention Fire Regime Condition Class was statistically significantly lower in the treatment version versus the comparison sites (mean difference of $-.386$ (95% CI, $-.469$ to $-.302, p < .001$) (see also Table 2).

Table 2**Adjusted and Unadjusted Intervention Means and Variability for Post-Intervention Fire Regime Condition Class with Pre-Intervention Fire Regime Condition Class as a Covariate**

		<i>Unadjusted</i>			<i>Adjusted</i>	
	<i>N</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SE</i>	
Treatment	105	2.10	.31	2.06	.03	
Comparison	105	2.39	.55	2.44	.03	

Note: N = number of participants, M = Mean, SD = Standard Deviation, SE = Standard Error

Conclusion

The results of the quasi-experimental evaluation study demonstrate that the NCC treatment of public land was effective in reducing the fire regime condition class (FRCC) of the treated land compared to the untreated comparison sites, thereby reducing the risk of catastrophic wildfire. The effect size of the treatment intervention as found to be large, with a partial eta squared value of .287. This large effect size will permit a smaller number of treatment and comparison site to be sampled in future grant cycles and still anticipate significant differences between the treatment and comparison sites. The results of the evaluation study provide evidence of the success of NCC's efforts. We can conclude that NCC's fuel reduction program activities are indeed effective methods to achieve the program goals.

References

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