Full Name [redacted]

10/15/2018

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Original submission

10/15/2018

Email Address	[redacted]
Professional Title	**Senior Environmental Specialist**
Organization	[redacted]
Do you meet all of the requirements for the Biological Science category?	**Yes**
Enter your courses that fulfill the 9 credits in Ecology	**Botany 354 Introduction to Plant Ecology 5 Quarter credits (3.35 Semester credits) University of Washington** **Botany 456 Plant Community Ecology 5 Quarter credits (3.35 Semester credits) University of Washington** **BOT 350 Intro to Plant Geography 4 Quarter hours (2.68 Semester hours) University of Washington** **BOT 360 General Mycology 5 Quarter credits (3.35 Semester credits) University of Washington**
Enter your courses that fulfill the remaining 6 credits in Biological Science	**BOT 371 Plant Physiology 3 Quarter credits (2.01 Semester credits) University of Washington** **BOT 372 Plant Physiology Lab 2 Quarter credits (1.34 Semester credits) University of Washington** **BOT 441 Vascular Plant Morphology 5 Quarter credits (3.35 Semester credits) University of Washington**
If any of your courses in this category do not have titles that appropriately indicate the course content, please provide additional explanation.	n/a

Do you meet all of the requirements for the Physical Science category?	**Yes**
Enter your courses that fulfill the 6 credits in soils, hydrology, and/or climate science	**FOR B 310 Forest Soils 4 Quarter hours (2.68 Semester hours) University of Washington** **GEOL 205 Physical Geology 5 Quarter credits (3.35 Semester credits) University of Washington**
Enter your courses that fulfill the 9 remaining credits in the Physical Science category	**CHEM 102 General and Organic Chemistry 5 Quarter credits (3.35 Semester credits) University of Washington** **CFR 600 Independent Research Wetland Water Quality Monitoring 6 Quarter credits (4.02 Semester credits) University of Washington** **GENET 451 Genetics 5 Quarter credits (3.35 Semester credits) University of Washington**
If any of your courses in this category do not have titles that appropriately indicate the course content, please provide additional explanation.	n/a
Do you meet all of the requirements for the Resource Management and Conservation Category?	**Yes**
Enter your courses that fulfill the 3 credits in ecological dimensions	**UHF 475 Wetland Ecology 4 Quarter credits (2.68 Semester credits) University of Washington** **ESC 529 Ecosystems Seminar 1 Quarter credit (0.67 Semester credit) University of Washington**
Enter your courses that fulfill the 3 credits in human dimensions	**ENV S Environmental Values and Perceptions 5 Quarter credits (3.35 Semester credits) University of Washington** **UHF 561 Public Presentations in Urban Horticulture 2 Quarter credits (1.34 Semester credits) University of Washington**
Enter the courses that fulfill the remaining 6 credits in the Resource Conservation and Management category.	**LARC 523 Landscape Restoration Techniques 6 Quarter credits (4.02 Semester credits) University of Washington** **FOR B 444 Tree Physiology 3 Quarter credits (2.01 Semester credits) University of Washington**

If any of your courses in this category do not have titles that appropriately indicate the course content, please provide additional explanation.	n/a
Do you meet all of the requirements for the Quantitative Science Category?	**Yes**
Enter your courses that fulfill the 6 credits in inventory, monitoring, and/or assessment	**STAT 311 Elements of Statistical Methods 5 Quarter credits (3.35 Semester credits) University of Washington** **QSCI 482 Statistical Inference in Applied Research 5 Quarter credits (3.35 Semester credits) University of Washington**
Enter your courses that fulfill the remaining 3 credits in the Quantitative Science category	**MATH 124 Calculus with Analytical Geometry 5 Quarter credits (3.35 Semester credits) University of Washington**
If any of your courses in this category do not have titles that appropriately indicate the course content, please provide additional explanation.	n/a
Do you meet all of the requirements for the Ecological Restoration Category?	**Yes**
Enter your courses that fulfill the 6 credits in Ecological Restoration.	**CFR 700 Masters Thesis Research (Restoration Ecology) 8 Quarter credits (5.36 Semester credits) University of Washington**

f any of your courses in this category do not have titles that appropriately indicate the course content, please provide additional explanation.	n/a
Upload Transcripts	[redacted]
Provide a brief description of your professional-level experience that satisfies the 5-year full time equivalent.	[redacted]
Upload CV/Resume	[redacted]
Check Project #1 to enter project details.	**Project #1**
Project #1: Name	**West Duwamish Greenbelt Forest Restoration**
Project #1: Location	**West Bank of the Duwamish River, Seattle Washington**
Project #1: Stage of Project	**Implementation**
Project #1: Objectives	**Return a degraded urban forest ecosystem to self-sustaining pre-settlement conditions.**
Project #1: Project Description	**The West Duwamish Greenbelt is a 100+ acre urban forest currently dominated by early successional trees, and a shrub understory dominated by a non-native invasive shrub (Rubus armeniacus). Prior to European settlement this site supported a mature conifer-dominated forest with a diverse understory of native deciduous and evergreen shrubs. Years of intensive logging and urban development removed all conifers and much of the native understory. In place of the native forest, a plant community dominated by red alder and big-leaf maple with a dense understory of Himalayan blackberry developed.** **The restoration effort sought to assist the natural recovery of the**

coniferous forest by creating openings in the deciduous forest, planting native conifers, and removing invasive shrubs and replacing them with native shrub species.

This project is part of the larger Green Seattle Partnership program that has committed to restoring 2500 acres of degraded urban forest. Much of the physical work of weed removal and native plant installation was accomplished by local community volunteers from neighborhoods adjacent to the Greenbelt.

The project aligns with SER principles (ecologically effective in maintaining and restoring ecological integrity, methodologically and economically efficient, and socially and culturally engaging process) as follows:

Over 20 acres of forest that were dominated by Himalayan blackberry, few native trees, and no native conifer trees currently support a native shrub understory and an overstory consisting of Douglas fir and western hemlock, or Sitka spruce and western red cedar, depending on individual micro-site moisture regimes. The blackberry continues to exist in some of these sites but with frequent monitoring and prescriptive weed removal based on monitoring results, the density of blackberry has decreased considerable hand has been reduced to almost undetectable levels at many sites. Monitoring for the presence of native birds has been initiated at some of these sites and while results of this monitoring go has yet to be fully analyzed, early results suggest restored sites support larger numbers and more species of native passerines than nearby non-restored sites. Plant species composition and structural diversity have been used as indicators for where the sites are on the trajectory toward a self-sustaining, lowland Pacific Northwest forest community and in several of the sites both the species composition

In terms of methodological and economic efficiency, because so much of the work is done by community volunteers, it has not always been efficient. Considerable field time is spent instructing and encouraging the volunteers, many of whom are teenagers. Some times the weeds are not fully removed or the plants are installed incorrectly, however careful monitoring and quality control from more experienced workers typically remedies these problems. The trade off between professional efficiency and involving community members has been worthwhile. Economically the project has been successful, again because of the large numbers of volunteers who complete the on-the ground work.

Inclusion of and consultation with immediate neighbors of the site has resulted in community ownership of the project. Due to the strong volunteer element of this project, the social and cultural engagement aspect has been very successful.

Describe how your project aligns with SER standards and principles of ecological restoration.	**Targets, goals and objectives, and reference ecosystems: the target ecosystem was modeled closely on existing remnant forest communities in th central Puget Sound region. Extensive data collection on biotic and abiotic features of the reference forest sites was conducted to develop a target ecosystem for the Greenbelt restoration. The project sought to assist in remedying problems that could not be remedied without assistance but did not seek to alter or adjust elements of the system, that were functioning well. Collaboration with the University of Washington, City of Seattle Parks ecologists, and local experts resulted in a robust approach.** **The planned restoration trajectory for the Greenbelt was to go from early successional, human-disturbance influenced to mature forest mosaic with reduced human disturbance. Human trampling has been reduced as a result of community engagement and education, strategic fencing, and construction of natural barrier to exclude illegal motorized dirt bike use.** **The key ecosystem attributes that were missing but have been reestablished are a seed source for native conifers and lower frequency and density of non-native invasive plants species.** **The six main elements addressed by the recovery wheel concept have been for the most part, addressed by the restoration efforts. The element for which we have the least evidence is external exchanges. The greenbelt is surrounded by a very urban area and would not be expected to have much exchange with those urban surroundings. The site is situated high above the Duwmish River. Bald eagles and osprey use the river, and increased cover of conifers in the Greenbelt provides habitat for these species. .** **The effort includes yearly monitoring, evaluation of monitoring results, and implementation of corrective measures and adjustments based on monitoring results to ensure the restoration efforts continue to move to the site toward full recovery. In terms of recovery, while the site has not been rigorously assessed using the 5-star recovery outcome approach, based on qualitative observations and the results of quantitative monitoring efforts site is likely at a three star level.**
Project #1: Describe your role in the project.	**As the Forest Restoration program Director for Nature Consortium, a non-profit organization dedicated to connecting people, art, and nature I oversaw Nature Consortium's contract with the City of Seattle to develop, implement and monitor forest restoration projects, using community volunteers from local low-income, underrepresented communities of people. My work included assessing restoration sites and developing planting plans, selecting and obtaining plant to be installed, identifying weed-removal areas, recruiting volunteers. training volunteers in proper field techniques including hand removal of weeds, on-site composting of removed weeds, site preparation for planting, plant installation and mulching, and site monitoring.**

Upload Project #1 Supporting Information (Optional)	n/a
Check Project #2 to enter project details.	**Project #2**
Project #2: Name	**Post Point WWTP Wetland Creation**
Project #2: Location	**Bellingham, Washington**
Project #2: Stage of Project	**Post-Implementation Maintenance**
Project #2: Objectives	**The objective of the project was to create a self-sustaining tidally influenced wetland system in a geographic area where these ecosystems have become rare due to development.**

Project #2: Project Description	**This project was initiated to provide out-of-kind mitigation for impacts to palustrine emergent wetland located adjacent to a municipal wastewater treatment plant (WWTP) on the shore of Puget Sound. Required WWTP expansion and upgrades resulted in loss of palustrine emergent wetlands in a region where palustrine emergent wetlands are common. Historically tidally influenced marsh ecosystems, including eelgrass-dominated plant communities were common along the Puget Sound shoreline but past industrial, commercial and residential development has destroyed most of these systems. When impact mitigation was required by federal and state agencies, it was decided to create a tidal marsh ecosystem as mitigation for the WWTP impacts because the municipality owned and controlled an undeveloped area of Puget Sound shoreline appropriate and suitable for construction of tidal wetland and had already initiated shoreline restoration nearby with some success. This project was not technically restoration, but I used to the greatest degree possible, given the funding and regulatory constraints, the principles of ecological restoration to develop and implement it.** **• Ecologically effective in maintaining and restoring ecological integrity. Earthwork and planting was completed in 2013. The site continues to experience regular tidal inundation and the plant community is relatively free of non-native invasive species and appears to have reached a level of stability in terms of plant community composition. Formal monitoring was conducted for 5 years; however, I have not participated in the monitoring since 2014 due to a job change.** **• Methodologically and economically efficient. The project was undertaken with municipal funding and while not a tiny budget, did have budgetary limitations. Due to its public ownership the project was necessarily managed with fiscal responsibility and care was taken upfront to ensure that plant material was of high quality, suited to the site conditions, and installed properly to eliminate the risk of failure from preventable problems. The opportunity for colonization by volunteer species was anticipated because of the tidal nature of the site, and therefore the management and monitoring plans allowed for colonization of the site by volunteer native species, and this contributed to site success.** **• Socially and culturally engaging. This project was undertaken to satisfy regulatory requirements. As such, relatively little opportunity for social and cultural engagement was offered. The primary social engagement came via SEPA and Shoreline Permit public comments and hearings. If given the opportunity to develop a similar project in the future I would encourage the municipality to consider providing opportunities for local citizens to be involved in planning, planting or monitoring the restoration project where possible.**

Describe how your project aligns with SER standards and principles of ecological restoration.	**Targets, goals and objectives: the objective of the project was to create a self-sustaining tidally influenced wetland system in a geographic area where these ecosystems have become rare due to development. The goals were to increase the amount of saltmarsh habitat along the northern shore of Puget Sound; establish a tidal water regime in a location with a minimal connection to salt water; establish a self-sustaining high saltmarsh plant community; and provide foraging habitat for great blue herons that nest adjacent to the site.** **Restoration trajectory: the trajectory was from freshwater meadow dominated by a mix of native and non-native herbaceous plant species to tidal salt marsh dominated by native plant species.** **Reference ecosystems: a composite reference ecosystem based on information about tidal influence and plant species composition in several existing Puget Sound estuarine wetlands was developed for the Post Point project.** **Key ecosystem attributes: key ecosystem attributes that needed to be established at this site were connection to tidal waters, creation of topography that would allow tidal waters to influence the planting area, a structurally-diverse native plant community that could survive indefinitely once established.** **Recovery wheel: the main elements of the recovery wheel have been addressed by this project. Absence of threats is not particularly applicable to this site because it was not necessarily threatened to begin with. However, now that the tidal ecosystem has been established, m the site has been protected with a Native Growth Protection Easement, and fencing and signage to minimize the threat from human disturbance.** **5-star evaluation system: applying the 5-star evaluation system, the Post Point site likely receives 4 stars.**
Project #2: Describe your role in the project.	**My role was to assist the municipality with environmental permits and approvals. As part of the permitting effort I designed, planned and oversaw implementation of the project, I was on site during the excavation to create a tidal connection and supervised all plant installation as well. I developed the post-installation monitoring approach and reviewed the monitoring reports.**
Upload Project #2 Supporting Information (Optional)	n/a
Check Project #3 to enter project details	**Project #3**
Project #3: Name	**Seattle City Light Pilot Vegetation Establishment Monitoring**
Project #3: Location	**Tukwila and Seattle Washington**
Project #3: Stage of Project	**Planning and Design**

Project #3: Objectives	**The project is a pilot study in City Light's transmission line corridors to test different vegetation treatments that might result in improved habitat values and determine the level of effort this would require. The Creston-Duwamish right-of-way were selected for the pilot study. The objective of the pilot study is to evaluate the effectiveness of several vegetation treatments to improve pollinator habitat in suppressing tree and invasive species compared to existing maintenance.**
Project Description	**Seattle City Light is investigating more ecologically-based approaches to vegetation management along the utility's transmission line rights-of-way (ROW). The goal of this approach is to reduce long-term maintenance costs while improving habitat values. Seattle City Light is required to manage vegetation in ROWs by the North American Electric Reliability Council (NERC) Standard FAC-003-3 — Transmission Vegetation Management Program.** **A significant factor in transmission line maintenance costs is the number of trees growing within the ROW. Invasive plants growing within ROWs also represent a maintenance cost as state and local laws require control of noxious weeds. However, vegetation in transmission line corridors can be manipulated to suppress regeneration of tree species. As an example, planting shrubs at sufficient densities can be a useful technique for suppressing non-native invasive plant species. Similarly, plant selection, spacing, and configuration are frequently used to suppress re-invasion by non-native species in habitat restoration projects.** **One of the elements of the Environmental Leadership Strategic Initiative is a pilot study in two of City Light's transmission line corridors to test different vegetation treatments that might result in improved habitat values and determine the level of effort this would require. The Creston-Duwamish right-of-way were selected for the pilot study.** **The objective of the pilot study is to evaluate the effectiveness of several vegetation treatments to improve pollinator habitat in suppressing tree and invasive species compared to existing maintenance.** **There are five vegetation treatments proposed for the pilot study:** **1) No maintenance (NM, Control),** **2) Existing maintenance (EM),** **3) Weed control only (WCO),** **4) Weed control plus planting a mix of shrub and forb pollinator species (PPS)** **5) Weed control plus planting a mix of grasses and forb pollinator species (PPH)** **Installed plant stock included both container grown and seed. Installed plants are listed in the attached plant list and include a mix of shrubs, grasses, and flowering forbs. The following are guidelines for establsihing plant communities in the pilot study treatment plots** **• Arrange plant species in clusters, each about 3.3 ft in diameter or more to increase pollinator** **efficiency and reduce potential for predation**

	• Use a diverse palette of native plant species such that blooms are available throughout the growing season. Ensure that the site has at least three native plant species blooming, at any given time during the spring, summer and fall. **• Plant a minimum of 15 different native plant species per plot such that a range of colors and flower morphologies are available to support a variety of pollinators.** **• Leave dead plant material and leaf litter to provide for pollinator nesting sites and shelter.** **• Include a minimum of one native, warm-season bunchgrass or sedge adapted to the site.** **• Include at least three native plant species that will provide food for insect larval stages in plantings** **How project addresses SER principles** **• Ecologically effective in maintaining and restoring ecological integrity: the purpose of this pilot study is to increase the likelihood that a larger-scale rehabilitation project will be ecologically effective** **• Methodologically and economically efficient: the purpose of the pilot study is to develop a methodologically and economically-effective method of maintaining powerline corridors and providing ecosystem benefits at the same time.** **• Socio and culturally engaging: at this stage of the project no social or cultural engagement has been implemented. Once a treatment method is selected based on the results of the pilot project, volunteers, including a youth program associated with the South Park neighborhood could be involved in installing the pollinator habitats.**
Describe how your project aligns with SER standards and principles of ecological restoration.	**This project is a pilot study conducted to aid in managing degraded and disturbed site in an ecologically sound manner and to increase the amount of habitat for native pollinator species. The project aligns with the principles of ecological restoration in that it uses information about existing ecosystems to develop plans to restore or rehabilitate degraded sites; it uses a fairly rigorous approach to evaluate potential site rehabilitation methods. This is not a strict restoration project but is rather a method for developing a sound site treatment approach that will contribute to improved ecosystem processes on large sites that are currently treated with herbicides and provide little habitat value.** **The results of this investigation can be used to inform future restoration and/or site rehabilitation efforts.**
Describe your role in the project.	**My role has been to manage all aspects of monitoring at these treatment plots for the past three years. Based on my observations and input, the methods were adjusted after the first year to better capture plant community characteristics.**