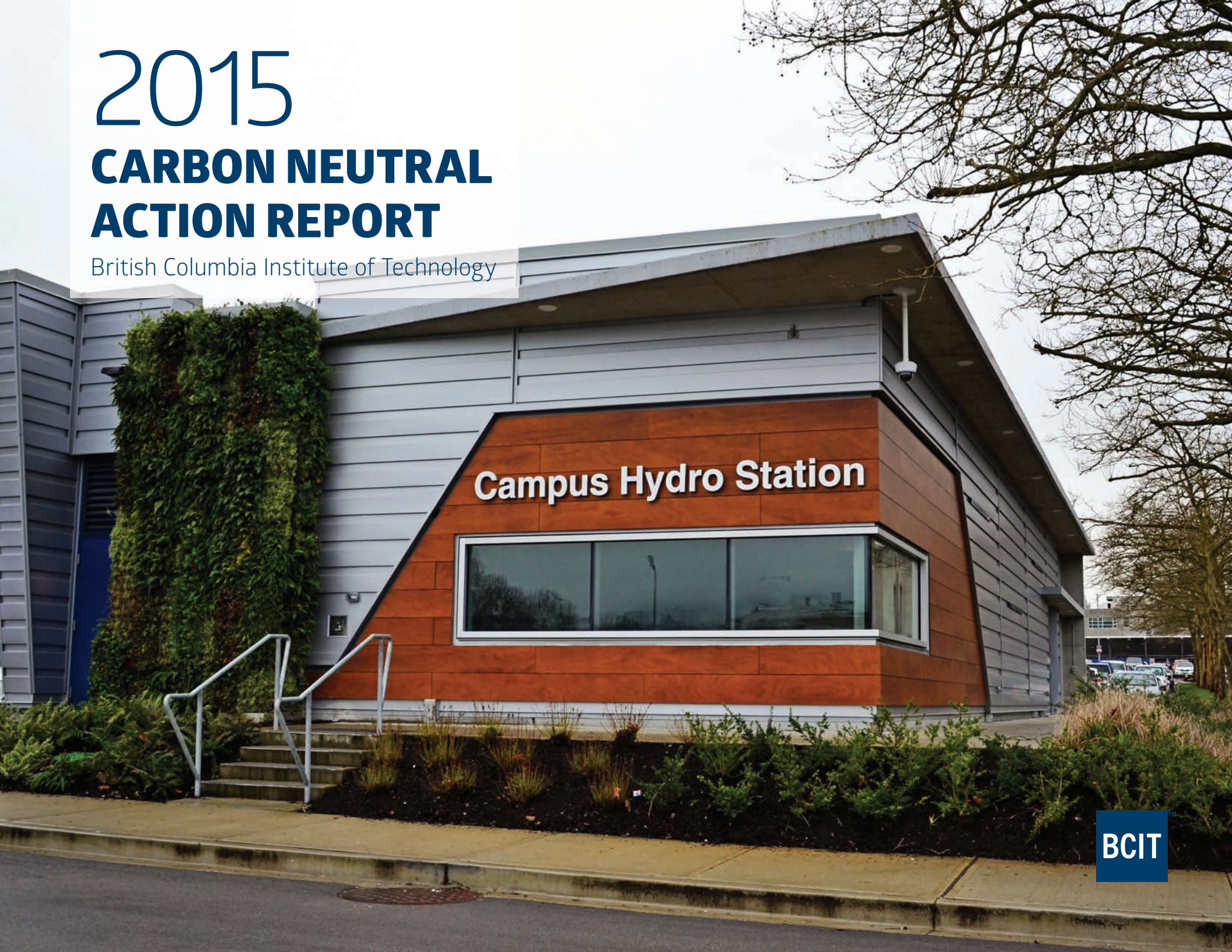
2015
CARBON NEUTRAL ACTION REPORT

British Columbia Institute of Technology



Declaration Statement

This Carbon Neutral Action Report for the period January 1, 2015 to December 31, 2015 summarizes our emissions profile, the total offsets to reach net-zero emissions, the actions we have taken in 2015 to reduce our greenhouse gas emissions and our plans to continue reducing emissions in 2016 and beyond.

By June 30, 2016, BCIT®'s final Carbon Neutral Action Report will be posted on our website at: **bcit.ca/facilities/sustainability/energy**

Emissions and Offsets Summary Table

BCIT GHG Emissions and Offsets for 2015 (tCO2E)	
GHG emissions created in calendar year 2015	
Total emissions	7,762
Total emissions for offsets	7,759
Adjustments to GHG emissions reported in previous years	
Total emissions	4
Total emissions for offsets	4
Credit owing from PCT at end of 2015 reporting year	
Credit owing	n/a
Total emissions for offsets for the 2015 reporting year	**7,763**

Retirement of Offsets

In accordance with the requirements of the Greenhouse Gas Reduction Targets Act and Carbon Neutral Government Regulation, BCIT (the Organization) is responsible for arranging for the retirement of the offsets obligation reported above for the 2015 calendar year, together with any adjustments reported for past calendar years. The Organization hereby agrees that, in exchange for the Ministry of Environment ensuring that these offsets are retired on the Organization's behalf, the Organization will pay the associated invoice to be issued by the Ministry in an amount equal to $25 per tonne of offsets retired on its behalf, plus GST.

Executive Summary

At the British Columbia Institute of Technology® (BCIT), our focus on increasing sustainability encourages ongoing innovation to support the social and economic prosperity of our campuses and the province without harming the natural environment. Across our communities, we value social equity and recognition of ecological limits on the amount of resources we can use without exceeding nature's capacity.

As we measure and report on our progress toward even greater sustainability, we track reduction in the land, energy and materials used to operate our campuses and the options to assimilate the wastes generated. Our sustainability advancements are also evidenced through engaged education and research, improved efficiencies of campus operations and the support of diverse green initiatives.

BCIT is well known for transforming innovative ideas into real results. As a strong supporter of the province's mission to reduce energy use and greenhouse gas (GHG) emissions, we have applied this results-driven approach to our sustainability practices. Putting mission strategy into action, campuses serve as living laboratories, where examples of environmental stewardship are always evolving. Our main Burnaby Campus is home to a green roof, a solar panel electric car charging station, a greenhouse and a wind turbine. 2015 also saw increased waste reduction and diversion, extended campus recycling reach and new vermicomposting of organic materials.

BCIT supports a population of over 15,000 full time staff and students. Here, we face the same environmental challenges as a small city, and as populations grow so do the demands on power and waste management systems. A sustainable undertaking to address these challenges was very visible in 2015. The Energy OASIS system, located on the Burnaby Campus, maintained partial operation during most of 2015 and began full operation by the end of November. Solar generation from the 250 kW photovoltaic installation reached close to 86 MWh. With the 500 kWh battery storage system, the energy supported peak power demands of our Burnaby Campus as well as provided a green power source for an electric vehicle charging station. Approximately 6 MWh was supplied to the two DC fast chargers and 3 MWh was used by the two Level 2 chargers.

This Carbon Neutral Action Report (CNAR) details some of the many diverse activities that we have undertaken in 2015.

Lorcan O'Melinn
Vice President, Administration and CFO
May 17, 2016

2015 Greenhouse Gas Emissions

In 2015, the total GHG emissions for BCIT was 7,762 tCO2e.

Offsets Applied to Become Carbon Neutral in 2015

BCIT purchased 7,759 tCO2e of offsets to become carbon neutral.

The variance of three tCO2e were from biomass emissions and do not require offsets.

Changes to Greenhouse Gas Emissions and Offsets Reporting from Previous Years

Four tCO2e were purchased as an adjustment to offsets from 2014. This offset was for December 2014 invoices not yet received prior to the 2014 reporting.

Emissions Reduction Activities in 2015

Key initiatives taken between January 1, 2015 and December 31, 2015 to reduce greenhouse gas emissions include:

- A Marine Campus Solar Array project that was funded in collaboration between BCIT Facilities and Campus Development and the Ministry of Advanced Education through the Carbon Neutral Capital Program (CNCP). The main component of the project involved installing a solar hot water system consisting of evacuated tube solar collectors on the rooftop of the Marine Campus (in North Vancouver) to offset natural gas usage that would have otherwise been needed to heat the existing training pool. The construction phase will be completed prior to March 31, 2016. Training of our marine experts just got a little greener.
- Construction of the new 25 kV Goard Way receiving and distribution centre was completed, improving electrical distribution for the south campus. The project included installation of a high efficiency generator, water reclamation gardens, a gathering space for students and a green wall.
- In 2015, solar generation from the 15 kW photovoltaic system on the Gateway building rooftop was approximately 15 MWh. The system is electrically connected to the Gateway building and supports its load in parallel with the power grid.
- The Energy OASIS system maintained partial operation during most of 2015 and began 24/7 full operation at the end of November. Solar generation from the 250 kW photovoltaic installation reached close to 86 MWh in the past 12 months. With the use of the 500 kWh battery storage system, the energy supported peak power demand of the BCIT Burnaby Campus as well as provided a green power source for the electric vehicle charging station in parking lot 7. Approximately 6 MWh was supplied to the two DC fast chargers and 3 MWh was used by the two Level 2 chargers.

OASIS electric vehicle charging kiosk

New EV charging stations at OASIS

- The existing boiler in building SE16 was providing both heating and domestic hot water and was operating inefficiently. The space heating and domestic hot water systems were decoupled to simplify system operation and improve efficiency. 96 percent efficient condensing on-demand hot water heaters were installed to supply the existing hot water storage tanks. The system is staged to match hot water demand and new gas and water meters have been provided so that the system operating efficiency can be monitored. Separating heating and hot water production allowed the existing boiler to run at a lower heating water temperature, improving efficiency by up to 10 percent by operating the boiler in condensing mode. This also allowed existing three-way control valves and other redundant pipe fittings to be removed, reducing pump energy requirements.
- Installation of new energy efficient boilers in buildings NE16 and SE12 was completed.
- Installation of a high efficiency air compressor in building NE16.
- Installation of two fire tube boilers with optimized fire side controls in building SE08.
- Installation of a high efficiency variable frequency flow HVAC system in building SW01.
- A makeup air unit was replaced and upgraded with a more efficient unit in building SW09.
- A series of lighting improvement projects took place, including:
  - An HID to LED retrofit at the pool of BCIT's Marine Campus
  - Various LED conversions at the BCIT CARI building
  - Various LED conversions at the Burnaby Campus including LEDs installed by the SE12 building breezeway
  - Good progress was made with replacing BCIT's 32 Watt and 30 Watt T8 tube lights with a 28 Watt version. More than 5,000 replacements were made in 2015.
- Completion of a pilot project for the use of a wireless and battery-less control technology to turn off lights in building NE1's atrium when daylight alone provides sufficient lighting levels.

Battery storage bin

- Preparation work took place for a full HID to LED conversion in the main hangar of BCIT's Aerospace Technology Campus. The retrofit will include an advance control strategy using wireless controllers to maximize the potential for daylight harvesting in this space exposed to a large amount of daylight.
- The Factor Four 300 kW biomass boiler system (wood-waste-to-energy) project made good progress in 2015. All equipment has been delivered on-site. Construction will start in 2016.
- Design work began for a new educational smart thermal grid to connect a series of Factor Four buildings to a distributed biomass and natural gas based district energy system. Construction drawings to be completed prior to March 31, 2016. Construction subject to financing.
- Preparation work for an HVAC recommissioning project at BCIT's Aerospace Technology Campus. The recommissioning will be completed prior to March 31, 2016.
- Major chiller rebuilds were undertaken at the Marine Campus, Downtown Campus and the CARI building, resulting in more efficient units.
- A study for the replacement of BCIT's walk-in freezers and refrigerators was completed and design work has started for this large renovation project to take place in 2016. The new system will include a new configuration of the space to make the refrigeration section a vestibule to the freezer portion, a new multi-compressor modulating rack system, smart controls, self-closing doors and high R-value walls.
- Planning work began for the replacement of old windows in BCIT's Centre for Architectural Ecology (building NE03 on the Burnaby Campus). The new windows will have a higher R-value and will help save energy. The project is being completed under the living lab concept, with a study on acoustic versus energetic value of windows being conducted on-site. The construction phase will be completed prior to March 31, 2016.
- Completion of a large energy study of BCIT's largest GHG single emitters at the Burnaby Campus central heating plant.

Self-watering planters

- Facilities Services purchased three new electric golf carts for staff to travel between buildings on campus.
- One cube van and two other vans were replaced with more fuel efficient vehicles.
- Facilities and Campus Development implemented technical standards which include minimum environmental and sustainability requirements for all BCIT construction projects.

Actions to Reduce Provincial Emissions and Improve Sustainability

- The food waste program was expanded to staff and student lounges throughout the Burnaby Campus in select locations. The program was in place at all satellite campuses in June 2015.
- Continued communications encouraging participation in Green Team initiatives through BCIT announcements in The Loop (employee news portal).
- The objective of 150 Office Doctor visits was met and the Green Team Office Doctor campaign ended on a successful note.
- Rain gardens were created at the Goard Way corridor. The rain gardens enable surface water run-off to be absorbed by specially selected local vegetation that filters sediment and reduces water flows into storm drainage systems. The plants provide bio-filtration of water run-off that ultimately enters the Guichon Creek/Still Creek/Burnaby Lake watershed.
- Four new maple trees were planted on campus, mitigating the heat-island effect in areas where there is a lot of concrete.
- Landscape overhaul of four areas on campus was achieved through the introduction of new plants and soil produced from organic waste, with special emphasis of native plant species and plants which adapt well to drought conditions.
- Introduction of 15 new self-watering planters, which minimizes water consumption through the water-containment system in the planter design. The self-watering planters are produced from recycled plastic waste.
- Introduction of a mason bee shelter and mason bee cocoons. Mason bees are hearty pollinators, and they are considered the ‘friendly bee’ as they do not have stingers.
- Use of vermicomposting, produced through the vermi bins maintained by the Recycling Department of Facilities Services. Vermi soil is the richest soil in organic content and nutrients.
- Again this year, BCIT promoted National Earth Hour, National Sweater Day and its internal campaign called Christmas Power Down.
- Many energy saving and sustainability tips were shared with the BCIT Community in 2015 using various channels such as The Loop, BCIT website and BCIT Marketing and Communications digital signs.

Food waste program

Plans to Continue Reduction of Greenhouse Gas Emissions and Improve Sustainability in 2016 and Beyond

BCIT will be focusing on the following key areas to reduce greenhouse gas emissions and improve sustainability in the coming year:

- Work has started on a multi-building energy study (across 12 buildings). The result of the study will inform the development of BCIT's next 3-year energy and GHG management plan set for the 2017-2020 period.
- A new task group has been created and tasked, under a VP leadership, to create BCIT's next 3-year energy and GHG management plan set for the 2017-2020 period.
- The BCIT Bookstore, which is already giving out biodegradable bags, will be moving to reusable bags only as of April 22, 2016.
- At the start of 2016, Energy OASIS will be upgraded with four additional Level 2 electric vehicle (EV) chargers for a new total of six Level 2 and two DC fast chargers for the parking lot 7 charging station. DC fast charge units will charge a vehicle to 80 percent in approximately 30 minutes. The Level 2 units will charge a vehicle to 80 percent in approximately four hours.
  - The upgrade will include the ability for EV drivers to use the EV driver kiosk at OASIS to opt for a fully "green" charge when using the Level 2 chargers. If drivers choose the green option, the charge will be completed using only electricity generated by the OASIS solar PV system when possible. The way this works is that drivers are asked how long they will be parked, and how long a charge they need. The system will then time their charge to use available solar energy as the source and to complete the charge by the time they are ready to leave. If there is no available solar energy by the time needed to complete the charge and meet their scheduled departure, then the system will charge from grid in order to deliver the charge. One of the main purposes of this feature is to gauge drivers' interest in taking advantage of a fully green charge.

Goard Way corridor rain gardens

- Domestic hot water distribution pipes are being lined with an epoxy resin in 2016 in order to seal up the pipes in an effort to eliminate leaks that are developing in the domestic hot water distribution system. This will result in less heat loss and water consumption.
- The DDC firmware on the Burnaby Campus will be upgraded.
- Old T-12 lighting will continue to be replaced with LED in the CARI building.
- The construction phase of the HID to LED conversion project in the main hangar of BCIT's Aerospace Technology Campus will be completed.
- Old rooftop HVAC units in building SE02 will be replaced with high efficiency units.
- Bicycles are being purchased for Facilities Services staff to make service calls without having to use fleet vehicles.
- Facilities Services is starting a pilot project with the HVAC department to distribute work requests to craftspeople through their online work request system which will eliminate the need to print paper copies. The department plans to begin moving trades staff to receive on demand work requests via mobile devices by the end of 2016, with a full implementation in 2017. The anticipated paper savings is at least 6,000 sheets per year.
- Creation of two areas on campus with green façades. Green façades are similar to living wall systems, the primary difference being that façades have rooted plants growing from ground level which climb up wall or trellis systems. Green façades provide a tremendous amount of benefit to the environment as they help mitigate greenhouse gas effects, they mitigate the heat island effect, and they can also provide pollen and nectar for bees and butterflies.
- Addition of more self-watering planters on campus.
- Creation of an edible ornamental garden: 75 blueberry shrubs have been planted at the Rix Grill patio. In addition to the fruit-bearing blueberry plants, five apple trees will be planted and grown espalier-style on the walls behind the blueberry plants. The apple trees will yield fruit this year as they are multi-graft with different varieties of apple on each tree. Multi-graft trees provide greater success for fruiting.
- Planting seven cherry trees cultivated from tissue by the Biotech Department of BCIT. Biotech has been working on tissue culturing the oldest flowering cherry trees that were originally donated to Vancouver by Japan in WWI.
- Removal on invasive Himalayan blackberry plants from Guichon Creek and replanting with plants native to the Pacific Northwest. The plants, which will replace the blackberries, will provide flower production from spring through late summer. The staggered bloom times will provide pollen for bees, a species at risk through urbanization.