IDAHO DEPARTMENT OF FISH AND GAME

Ed Schriever, Director

F18AF01194

Bombus (Western Bumblebee) Habitat Seed Library
Cooperative Endangered Species Conservation

Final Performance Report

Performance Period
October 1, 2018 through June 30, 2020

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August 2020
Boise, Idaho

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ESA TRADITIONAL SECTION 6
FINAL PERFORMANCE REPORT

1. **State:** Idaho

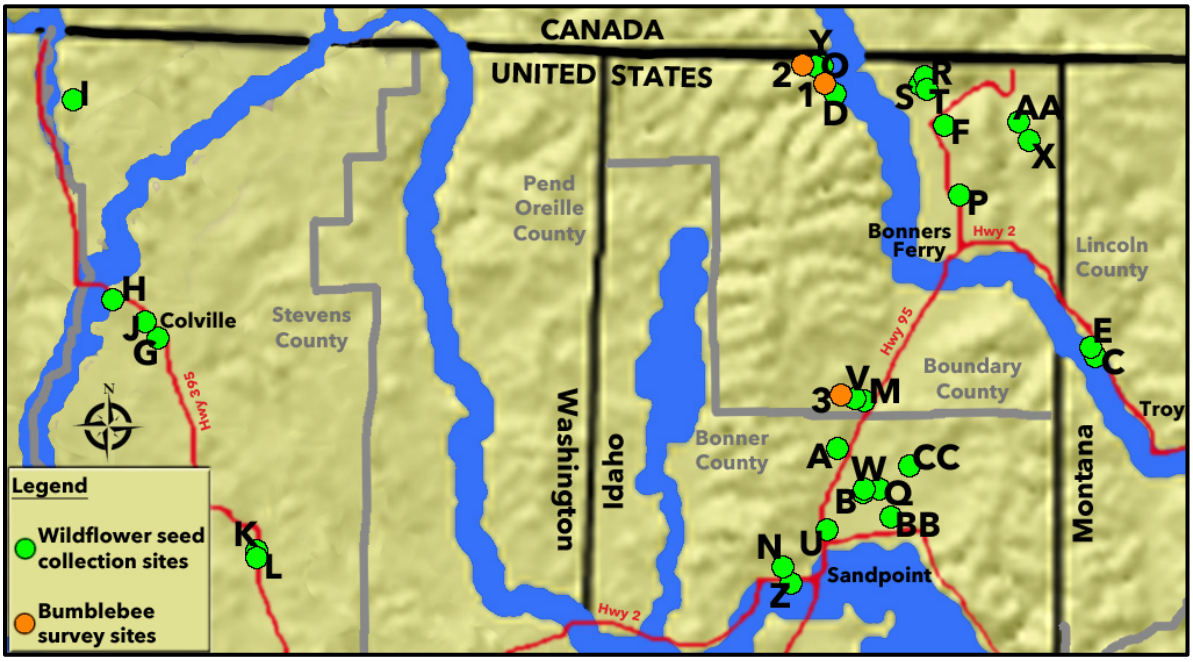
   Grant number: F18AF01194

   Grant name: *Bombus* (Western Bumble Bee) Habitat Seed Library

2. **Report Period:** October 1, 2018 through June 30, 2020

   Report due date: September 28, 2020

3. **Location of work:**



Map 1. Bumble bee survey sites (numerically labeled 1 – 3, data in Table 2) and wildflower seed collection sites (alphabetically labeled A – CC, data in Table 3), from October 1, 2018 through December 1, 2019 in the states of Idaho, Montana, and Washington. Sites include both guided group events and independent volunteer time (data in Table 1).

4. **Objectives**
   The Objectives of this grant are the following deliverables
   1) 25 volunteers engaged
   2) 25 seed collection sites
   3) 10 seed species collected
   4) Location database of seed sources and pollinator species

This project contributes to the following goals in the Idaho Department of Fish and Game (IDFG) State Wildlife Action Plan (SWAP):

Improve landscape climate resiliency for western bumble bees

- Treat nonnative vegetation and re-vegetate with locally collected pollinator food source.
- Implement participatory science programs that include climate change, habitat restoration, and invasive species elements.
- Create new urban and rural pollinator habitat.

Develop programs to encourage urban and rural landowners to create pollinator habitat.

Determine pollinator population status

- Conduct surveys for western bumble bees.

5. **If the work in this grant was part of a larger undertaking with other components and funding, present a brief overview of the larger activity and the role of this project.**

This project is part of a larger undertaking with other components and funding. The Idaho Panhandle Bees to Bears Climate Adaptation Project (B2B) is a cooperative partnership between IDFG and the Yellowstone to Yukon Conservation Initiative. This project is funded by grants from the US Fish and Wildlife Service, Wildlife Conservation Society Climate Adaptation Fund, and Doris Duke Charitable Foundation. Its focus is restoring 250 acres of forested lowland habitat to improve landscape climate resiliency for 6 Species of Greatest Conservation Need on the Boundary-Smith Creek Wildlife Management Area (WMA). Climate specific actions of the larger B2B project include: 1) Restoration of ephemeral flood cycles to benefit western toads (*Anaxyrus boreas)* and Northern leopard frogs *(Rana pipiens),* 2) creating topographically altered pollinator habitat to provide cool-air refugia for western (*Bombus occidentalis)* and Suckley's Cuckoo (*Bombus suckleyi*) bumble bees, and 3) reforestation with 50,000 native trees and understory plants to provide cover for grizzly bears (*Ursus arctos*), and improve soil moisture content and reduce air temperatures for pale-jumping slugs (*Hemphillia camelus*). Engagement of volunteers from the local community as community scientists is a project priority, which USFWS F18AF01194 directly addresses.

6. **Describe how the objectives were met.**

Activities conducted under this grant contributed to the achievement of all the SWAP objectives and actions detailed above. The activities exceeded deliverables outlined in the F18AF01194 grant proposal.

<u>Activities contributing directly to determining pollinator population status</u>

From June – August we partnered with Selkirk Outdoor Leadership and Education (SOLE) to host three public 'Family Day' bumble bee surveys in Boundary County (Table 1). We identified 6 bumble bee species during these workdays (Table 2). This year, we detected western bumble bees (*Bombus occidentalis*) on two occasions, but did not detect Suckley's cuckoo (*Bombus suckleyi)* bumble bees.

Figure 1. A volunteer with a Western bumble bee (*Bombus occidentalis*) she captured during our Family Day at the Boundary-Smith Creek WMA, Idaho, on July 19, 2019.

Activities contributing directly to improving landscape climate resiliency for western bumble bees, and developing programs to encourage urban and rural landowners to create pollinator habitat.

In early May, we produced a second edition of our wildflower seed collection manual for community scientists. The new edition incorporated feedback from 2018 community scientist collection notes and an experienced seed collector (Table 1) on seed phenology and collection techniques. Pictures of seeds were also added next to each species.

In partnership with the Idaho Master Naturalist Program of IDFG, we hosted a seed collection training in May (Table 1). This training garnered 2 child and 9 adult active seed collectors for our 2019 season.

Community outreach was an important aspect of this project. We maintained regular communication with our volunteers and the community via a project Facebook page and emails. We shared eight monthly blogs through the Facebook page and also conducted in-person community outreach events such as a May project presentation to the Kinnicinick Native Plant Society. Approximately 75 people attended this event in Sandpoint, ID.

Our work in 2018 inspired the Kootenay Native Plant Society in British Columbia (BC), Canada to launch a sister project in 2019. We collaborated to host a wildflower seed collection, habitat restoration, and bumble bee identification training in Balfour, BC in June (Table 1). Approximately 25 people attended this training. Their volunteer hours are not reported within this document, as attendees were Canadian Community's working toward Canadian conservation goals.

Figure 2. Volunteers learning about wildflower seed collection during the field portion of a community science training event inspired by this project and hosted by the Kootenay Native Plant Society in Balfour, Canada on June 8, 2019.

From June - October, we led group wildflower seed collection events and coordinated individual seed collection by volunteers. We held 8 group seed collection events that garnered seed from 12 species. Also during these months, individual volunteers worked to collect wildflower seed independently. They contributed many hours of volunteer service and gathered seed from 25 additional wildflower species (Table 1, Table 3).

Figure 3. Planting milkweed starts at the Boundary-Smith Creek WMA, Idaho, on June 22, 2019. For this event, an experienced volunteer plant culturist sprouted seeds from those collected by volunteers in 2018.

We held 2 final public engagement events in partnership with the Idaho Conservation League in late October and early November (Table 1). These events were the culmination of the Bees to Bears partnerships and volunteer work over the past 2 years. With the variety of seeds collected, we created 5 ecotype seed mixes – Riparian (R), Meadow (M), Shady Forest (S), Open Forest (F), and Wetland (W) (Table 3). Many veteran volunteers attended these events to spread their mixes across our restoration area.

Figure 4. Volunteers spreading *Bombus* Seed Library seed mixes across the restoration area at the Boundary-Smith Creek WMA, Idaho, on November 2, 2019.

7. **Discuss differences between work anticipated in grant proposal and grant agreement, and that actually carried out with Federal Aid grant funds.**
In addition to a final report, the grant proposal outlined 4 deliverables:

1) 25 volunteers engaged:
A total of 82 individual volunteers, consisting of 53 adults and 29 minors, contributed a total of 741 volunteer hours during Family Day bumble bee surveys, group seed collection and planting events, and individual seed collection efforts. This exceeds the total grant deliverable objective. Because we generated more match than required, 429.5 volunteer hours accounted for in this report are being used as non-federal match for Idaho's State Wildlife Action Plan Implementation, Grant #: F19AF00846.
2) 25 data collection sites:
Volunteers conducted bumble bee surveys in groups at 2 sites, and collected wildflower seed in groups or individually at 29 sites, for a total of 31 sites. This exceeds the total grant deliverable objective.
3) 10 seed species collected:

Volunteers collected seed from 37 species. This exceeds the total grant deliverable objective.

4) Location database of pollinator forage species and western bumble bee detections: A location database of pollinator forage species seeds collected and bumble bees identified by volunteers in both group and individual efforts has been submitted to the Idaho Fish and Wildlife Information System. This satisfies the grant deliverable objective.

8. List any publications or in-house reports resulting from this work.

Boyd, K. 2019. The Bees to Bears Climate Adaptation Project Wildflower Seed Collection Manual, 2nd Edition. Idaho Department of Fish & Game, Coeur d'Alene, Idaho, USA. https://idfg.idaho.gov/sites/default/files/bears2bees_manual_2.0_final.pdf

Boyd, K. 6 May 2019. A Wildflower Seed Collection Manual for the Bees to Bears Climate Adaptation Project [Blog Post]. Retrieved from https://idfg.idaho.gov/blog/2019/04/wildflower-seed-collection-manual-bees-bears-climate-adaptation-project

Boyd, K. 4 June 2019. Feast Fit for a Queen [Blog Post]. Retrieved from https://idfg.idaho.gov/blog/2019/05/feast-fit-queen

Boyd, K. 1 July 2019. Rare Bumblebee Found on WMA [Blog Post]. Retrieved from https://idfg.idaho.gov/blog/2019/07/rare-bumblebee-species-found-wma

Boyd, K. 24 July 2019. Volunteers Find Rare Bumblebees on WMA [Blog Post]. Retrieved from https://idfg.idaho.gov/blog/2019/07/volunteers-find-rare-bumblebees-wma

Boyd, K. 5 September 2019. 'Tis the Season for Seeds [Blog Post]. Retrieved from https://idfg.idaho.gov/blog/2019/09/tis-season-seeds

Boyd, K. 2 October 2019. How to Save a Seed… and an Ecosystem [Blog Post]. https://idfg.idaho.gov/blog/2019/09/how-save-seed-and-ecosystem

Boyd, K. 4 November 2019. A Far-Away Meadow [Blog Post]. Retrieved from https://idfg.idaho.gov/blog/2019/11/far-away-meadow

Boyd, K. 16 December 2019. Bees 2 Bears Project Ends with Long List of Accomplishments [Blog Post]. Retrieved from https://idfg.idaho.gov/blog/2019/12/bees-2-bears-project-ends-long-list-accomplishments

Idaho Fish and Game. 2019. *Bombus* (Western Bumblebee) Seed Library Project F18AF01194 Interim Progress Report. Boise, Idaho.

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Table 1. Dates, event types, locations, attendance, and collective hours of volunteer engagement during group Communitycommunity science activities hosted from April 1, 2019 through December 1, 2019, Boundary County, ID and Lincoln County, MT.

Date	Event Type	Target	Location	# Minors *	# Adults *	Hours
Apr	Seed Collection Manual Revision	Seed Collection	Online	0	1	6
Apr - Oct	Independent Community Science	Seed Collection	See Table 3	4	9	226
May 30	Community Science Training	Seed Collection	Kootenai National Wildlife Refuge	2	10	68
Jun 8	Community Science Training	Seed Collection	Balfour, British Columbia	0	25	0
Jun 21	Family Day #1	Bumble bee Survey	Boundary-Smith Creek WMA	8	3	43
Jun 22	Group Community Science #1	Milkweed Planting	Boundary-Smith Creek WMA	0	3	26
Jul 19	Family Day #2	Bumble bee Survey	Boundary-Smith Creek WMA	12	7	75
Jul 20	Group Community Science #2	Seed Collection	Boundary-Smith Creek WMA	2	1	18
Aug 16	Family Day #3	Bumble bee Survey	McArthur Lake WMA	6	3	35
Aug 17	Group Community Science #3	Seed Collection	Kootenai / Yaak River	2	1	15
Sep 15	Group Community Science #4	Seed Collection	McArthur Lake WMA	1	3	18.5
Sep 21	Group Community Science #5	Seed Collection	Boundary-Smith Creek WMA	1	0	6
Sep 28	Group Community Science #6	Seed Collection	Kootenai / Yaak River	0	2	8
Oct 19	Group Community Science #7	Seed Collection	Boundary-Smith Creek WMA	0	1	5
Oct 24	Group Community Science #8	Seed Collection	Kootenai / Yaak River	0	2	7
Oct 26	Group Community Science #9	Seed Planting	Boundary-Smith Creek WMA	0	13	52.5
Nov 2	Group Community Science #10	Seed Planting	Boundary-Smith Creek WMA	4	23	132
Totals	17 activities			42 minors	107 adults	741 hours

* Numbers represent event attendance. Some individual volunteers participated in multiple events. Accounting for individuals, we engaged 29 unique minors and 53 unique adults.

Table 2. Species, common names, and individual counts of bumble bees (genus *Bombus*) detected at each Family Day Bumble Bee Survey event from Jan 1, 2019 through December 1, 2019, Boundary County, ID.

		Count of Species Identified at Bumble bee Survey Events			
Species	Common Name	Family Day #1	Family Day #2	Family Day #3	Totals
B. bifarius	Two-form Bumble bee	0	5	6	11
B. centralis	Central Bumble bee	0	0	2	2
B. flavifrons	Yellow head Bumble bee	1	0	22	23
B. mixtus	Two-form Bumble bee	0	1	0	1
B. occidentalis	Western Bumble bee	0	3	0	3
B. vagans	Half-black Bumble bee	0	6	0	6
Totals	6 species	1 bumble bee	15 bumble bees	30 bumble bees	46 bumble bees

Table 3. Species, common names, seed mix assignment (R = Riparian, M = Meadow, S = Shady Forest, F = Open forest, W = Wetland), site map identification letter, site locations, dates, and quantities of seed collected from June 1, 2019 through December 1, 2019, Boundary, Bonner, and Kootenai County, ID, Lincoln County, MT, and Stevens County, WA.

Species	Common Name	Seed Mix	Collection Date	Site Map ID	Site Location Easting	Site Location Northing	Quantity (cups)
Achillea millefolium	Western Yarrow	M	8/21	A	48.456082	-116.48535	0.25
			9/1	B	48.404150	-116.45654	0.5
			9/23	A	48.456082	-116.48535	0.25
Adenocaulon bicolor	Pathfinder	F	9/28	C	48.553300	-115.97343	0.5
Anaphalis margaritaceae	Pearly Everlasting	F	8/29	A	48.456082	-116.48535	1
Antennaria racemosa	Racemose Pussytoes	F	6/16	A	48.456082	-116.48535	0.25
Apocynum androsaemifolium	Spreading Dogbane	R	8/21	A	48.456082	-116.48535	0.5
Apocynum cannabinum	Clasping-leaf Dogbane	R	10/19	D	48.977760	-116.53953	4
			10/24	E	48.560337	-115.97258	2
Arctostaphylos uva-ursi	Bearberry	F	8/21	A	48.456082	-116.48535	0.25
Arnica cordifolia	Heartleaf Arnica	S	6/17	F	48.897543	-116.34443	8
Asclepias syriaca	Common Milkweed	M, R	9/6	G	48.543333	-117.91556	8
			9/11	H	48.598056	-118.01028	8
			9/11	I	48.875334	-118.13394	2
			9/11	J	48.571389	-117.94333	8
			9/11	K	48.251747	-117.71529	8
			9/11	L	48.241944	-117.71528	8
Bidens frondosa	Common Beggartick	W	9/8	M	48.519810	-116.45234	4
Camassia quamash	Common Camas	W	7/19	N	48.272548	-116.59437	0.25
Campanula rotundifolia	American Harebell	F	9/21	O	48.997810	-116.56887	0.5
Carex comosa	Bristly Sedge	W	10/12	M	48.519810	-116.45234	4
Ceanothus velutinus	Snowbrush	M	8/21	A	48.456082	-116.48535	0.5
Chamerion angustifolium	Fireweed	F	7/19	P	48.805100	-116.31778	2
			8/21	A	48.456082	-116.48535	2
			10/2	Q	48.404950	-116.43678	0.5
Chimaphila umbellata	Prince's Pine	F	8/21	A	48.456082	-116.48535	0.25
Erigeron speciosus	Showy Daisy	M, F	8/1	R	48.984721	-116.38055	4
			8/1	S	48.977148	-116.38381	8
			8/1	T	48.973409	-116.37021	8
Eurybia conspicua	Showy Aster	M, F	9/15	Q	48.404950	-116.43678	2
			9/23	U	48.311822	-116.54528	0.5

			10/2	Q	48.404950	-116.43678	0.5
			10/14	Q	48.404950	-116.43678	1
Geum macrophyllum	Laregleaf Avens	S	9/8	V	48.520680	-116.45500	1
Heracleum lanatum	Cow Parsnip	S	8/15	W	48.401650	-116.45918	0.5
Lupinus macrophyllum	Bigleaf Lupine	F	6/3	U	48.311822	-116.54528	0.25
			6/13	U	48.311822	-116.54528	0.25
			6/20	U	48.311822	-116.54528	0.25
			6/21	N	48.272548	-116.59437	0.5
Lupinus sericeus	Silky Lupine	F	8/1	X	48.883614	-116.12423	0.5
Mahonia repens	Creeping Oregon Grape	F	7/20	Y	48.998350	-116.56726	2
			10/1	A	48.456082	-116.48535	0.25
			10/4	A	48.456082	-116.48535	0.25
Maianthemum stellatum	Starry False Solomon's Seal	S	9/12	Z	48.264440	-116.56222	0.5
			10/12	A	48.456082	-116.48535	0.25
Monarda fistulosa	Beebalm	R	9/28	C	48.553300	-115.97343	1
			10/24	C	48.553300	-115.97343	0.5
Penstemon confertus	Yellow Beardtongue	M	8/1	AA	48.912392	-116.15125	2
Philadelphus lewisii	Lewis' Mock Orange	F	9/15	A	48.456082	-116.48535	0.25
Polygonum pensylvanicum	Pennsylvania Smartweed	W	10/12	M	48.519810	-116.45234	2
Prunella vulgaris	Self-heal	S	8/5	P	48.805100	-116.31778	0.5
Pyrola minor	Lesser Wintergreen	S	9/21	Y	48.998350	-116.56726	0.25
Sagittaria latifolia	Common Arrowhead	W	9/8	M	48.519810	-116.45234	4
Scirpus cyperinus	Woolgrass	R	10/29	M	48.519810	-116.45234	8
Solidago canadensis	Canada Goldenrod	R	8/26	A	48.456082	-116.48535	3
			9/12	BB	48.351200	-116.42304	1
			9/15	Q	48.404950	-116.43678	1
Spiraea betufolia	Birchleaf Spirea	M	8/21	A	48.456082	-116.48535	0.25
Spiraea douglasii	Douglas Spirea	M	8/29	A	48.456082	-116.48535	0.25
Symphoricarpos albus	Common Snowberry	F	10/1	A	48.456082	-116.48535	0.5
			10/24	E	48.560337	-115.97258	1
Viola canadensis	Canada Violet	S	6/27	CC	48.424470	-116.40093	0.5
Totals	37 species	5 mixes	62 collections	29 sites			130 cups

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