

Seeds of Success: 2017 Field Season Report



Photo: Chicago Botanic Garden Interns Jacob DeKraai, Robert Tepperberg, and Stacy Bowser collecting *Calamagrostis canadensis* seed on the Nome-Council Road in the Seward Peninsula.

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Introduction

In 2000, the Bureau of Land Management (BLM) engaged in a collaborative effort to establish a seed collection for native plants nationwide. The seed collection was specifically intended for conservation purposes, particularly for restoration and emergency fire rehabilitation projects, but also intended to bank seeds for future needs. To meet these goals, protocols for documentation and methodologies were established for seed collection at the population level. This effort was part of a nationwide, interagency program known as “Seeds of Success” (SOS), and for several years was also a part of the international “Millennium Seed Bank Partnership” of the Royal Botanic Gardens, Kew in the United Kingdom.

The BLM Alaska State Office has been designated with the SOS National collector code of ‘SOS AK930’. Since 2007, the BLM Alaska State Office has partnered with the Alaska Center for Conservation Science (ACCS) at the University of Alaska Anchorage to collect seeds from targeted populations of native plants in the state. To date ACCS has made 809 SOS collections from 318 different taxa across Alaska (). This report summarizes the 2017 SOS Field season where SOS collections were made, challenges, and potential future SOS collection sites and strategies.

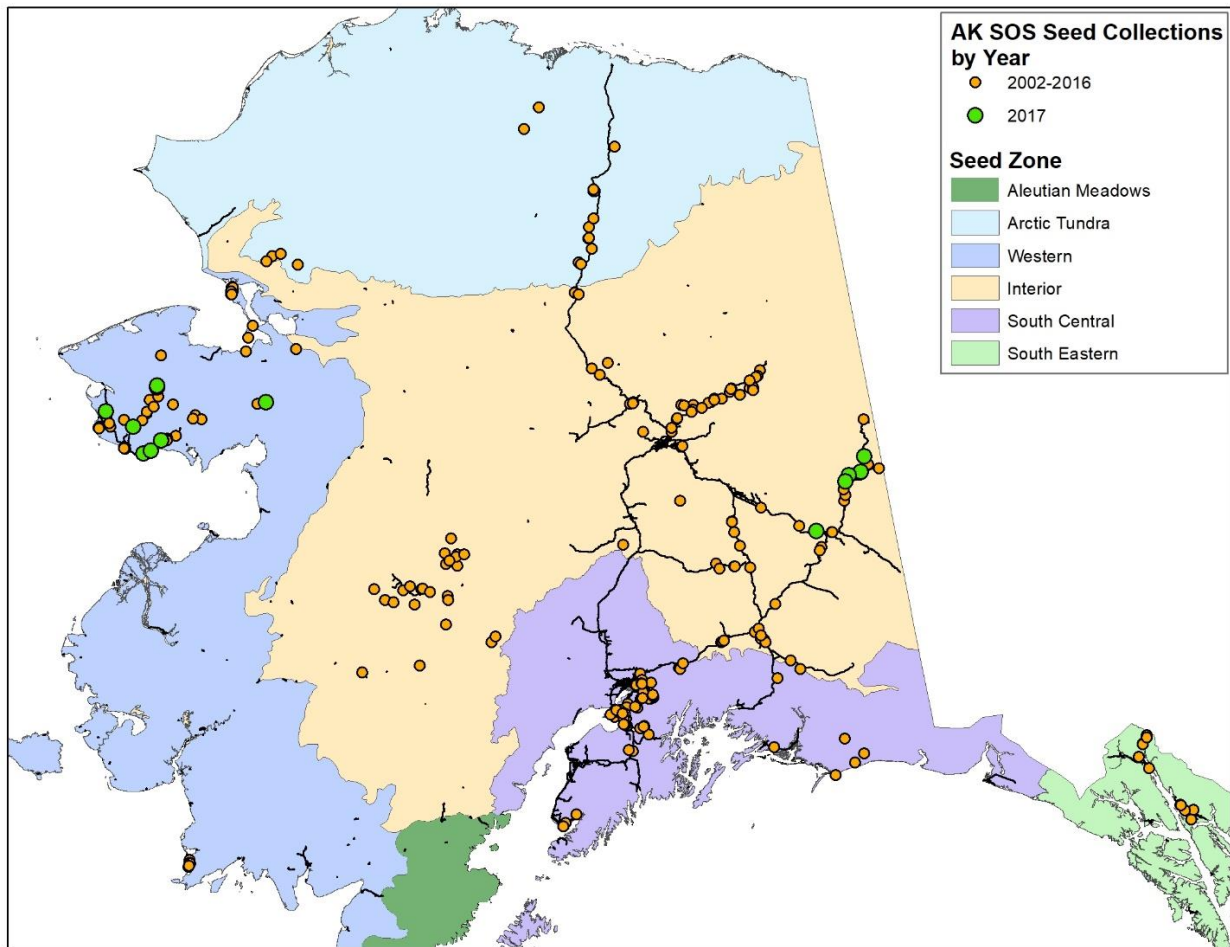


Figure 1. Alaska SOS collection sites since 2002

Methods

The ACCS team used the SOS national protocols for seed collections and associated voucher specimens and data. We attempted to achieve the recommended collection of 10,000 to 20,000 seeds from each species in a given plant population. However, 6,000 viable seeds at minimum are required for the SOS program. Seeds were gathered from at least 50 individual plants to maximize within population genetic diversity and collectors did not gather more than 20% of the seed produced by a population to minimize



Figure 2. CBG Intern Jocelyn Munoz collecting *Vaccinium uliginosum* (bog blueberry) fruit at ‘Y-dirt road’, south of Chicken.

impacts to population persistence. Species of conservation concern, agricultural species, and species with recalcitrant seeds are not within the scope of the project; these, as well as non-native species, were not collected. Collecting efforts were focused on species with traits that would provide advantages in the contexts of stabilization, restoration, and rehabilitation. Seed collections were transferred to the Alaska Plant Materials Center, Division of Natural Resources, for processing, storage, and in some cases grown for an increase of seed quantity.

In addition to the seed collections, digital photographs and data on the location, habitat, associated species, landform, land use, geology, and soil type were recorded for each collection site. These data were submitted to the national program offices in Washington DC and copies are kept at ACCS in Anchorage. New for this season, the national program office fully implemented an online data portal where data are submitted electronically. Photographs are located in Appendix A and scanned data sheets are in Appendix B. Three voucher specimens were taken for most collections. These specimens were sent to the U.S. National Herbarium at the Smithsonian (US), the herbarium the University of Alaska Anchorage (UAAH), and the herbarium of the Museum of the North at the University of Alaska Fairbanks (ALA). Herbarium voucher data from UAAH can be viewed online at: <http://www.pnwherbaria.org/>. This project fell within the State of Alaska guidelines for non-commercial harvesting, and thus did not require a permit for collections on state land. For the 2017 field season, SOS AK-930 had a goal of 60 collections.

The scope of work was concentrated in the Seward Peninsula and Yukon-Tanana Uplands ecoregions (Nowacki et al. 2001). Within the Seward Peninsula, collections were focused on the road system on the Nome-Council Road and Kougarock Road. In the Yukon-Tanana Uplands, collections were focused in the area of Chicken and Jack Wade (; Figure 2). The Seward Peninsula collections are located within the Western Seed Zone and the Yukon-Tanana Uplands are located

in the Interior Seed Zone. An opportunistic collection of *Eriophorum vaginatum* (tussock cottongrass) was collected in the Seward Peninsula by ACCS staff during a BLM vegetation study of the Western Arctic Caribou Herd. Additionally, an opportunistic collection of *Arctostaphylos uva-ursi* (kinnikinnick) was made by Chicago Botanic Garden (CBG) interns at the Tanacross airstrip. Non-native plant species with the Alaska Exotic Plants Information Clearinghouse (AKEPIC) Invasiveness ranks above 60 were recorded at all seed collecting sites and submitted to AKEPIC.

Four CBG interns, Stacy Bowser, Jacob DeKraai, Jocelyn Munoz, and Robert Tepperberg aided ACCS staff for the Seeds of Success project this season (Figure 2 and Figure 3). Scouting of the Chicken for potential suitable sites was done by interns in July. Seed was collected in Seward Peninsula on July 8 and between August 18th and 21st. Seed collections from the Yukon-Tanana Uplands area occurred between August 28th and 30th.

Results

A total of 64 collections were made from 50 different species at 15 different site locations (Table 1). Thirty-nine collections were made in the Seward Peninsula, while 25 were made in the Yukon-Tanana Uplands. Scouting trips were a valuable tool for finding plant populations in the peak of flower that enhanced accurate plant identification. Furthermore, scouting trips with the interns provided essential plant identification skills, practice in data and plant collection, and education of ecology in Alaska.

Seward Peninsula Region

There was an opportunity to collect *Eriophorum vaginatum* (tussock cottongrass) in early July during a BLM vegetation study of the Western Arctic Caribou Herd that ACCS Botanist assisted with. The general locality is off the road system and accessible only by helicopter. Unfortunately,



Figure 3. CBG Intern, Robert Tepperberg, collecting seed of *Calamagrostis canadensis*, *Deschampsia cespitosa*, *Bromus inermis* ssp. *pumpellianus*, *Eurybia sibirica*, and *Chamerion angustifolium* at the Kougarok Bridge in the Seward Peninsula.

no other species were at a suitable collecting phenology during this trip to take advantage of being off the road system. All of the other Seward Peninsula material were collected on the road system away from Nome.

Previously, seed collection trips by ACCS occurred in late August of 2010 and early August of 2013. The 2010 season was productive with 74 collections made, however the 2013 season was less productive with only 13 seed collections. The 2013 season was marked with a late spring and mild summer, providing little available seed material for collecting during the visit

since the majority of species were still in full flower. Traveling to the Seward Peninsula is a significant expense and ACCS staff relied on previous collecting dates and field updates of flowering maturity from BLM Nome Field Station staff for ideal timing of seed collections. The collection times of mid-late (August 18th and 21st) were peak timing of seed maturity for nearly all species this year. Nome Field Station staff, Brian Ubelaker and Tom Sparks, provided essential information on land status, safety, and potential collecting areas. Nome Field Station staff provided a BLM vehicle to use for the seed collecting trip and lodging for the CBG interns. Brian Ubelaker made a herbarium voucher of *Chamerion angustifolium* from Kougarok Bridge in mid-September as this was mistakenly overlooked during the seed collecting trip in August.

The Nome-Council Road connects Nome to Council and provided more public land access compared to the Teller Road and Kougarok Road (Figure 4). This year, 20 seed collections originated from this road section. Both the Safety Sound Bridge and Milepost 28.5 sites were marine influenced dry graminoid herbaceous meadows. The Safety Sound Bridge location was easily accessible with multiple dirt roads. Seed was collected within 0.25 km of the Nome-Council Road as it provided quick easy access to the coastal tidal marsh and gravel out-wash habitats that hosted abundant seral species. Further exploration of the dirt road to the ocean access is suggested to find new populations target species. Milepost 28.5 of the Nome-Council Road was a narrow strip of public land marked with vegetated sand dunes. Notable SOS species from these sites

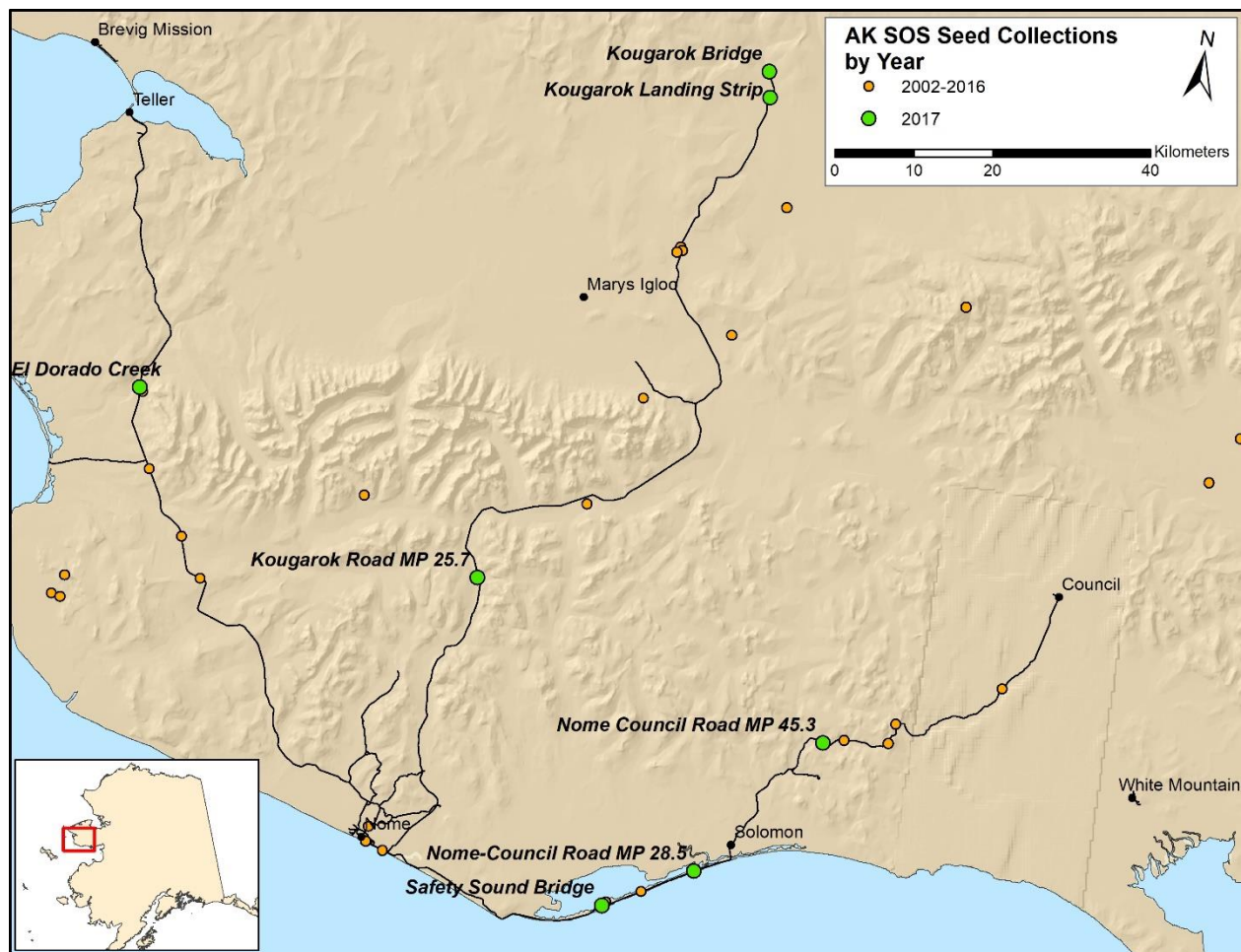


Figure 4. The 2017 SOS site collections from the Seward Peninsula

include: *Senecio pseudoarnica*, *Leymus mollis* ssp. *villosissimus*, *Carex gmelinii*, *Chrysanthemum arcticum* ssp. *polare*, *Artemisia tilesii*, and *Calamagrostis canadensis*. It has been rare to find populations of *Polemonium acutiflorum* that meet the SOS standard in Alaska, but we were able to make seed collections at Milepost 28.5.

Milepost 45.3 was an easily accessible fluvial floodplain site that had many SOS target species. There were eight collections made at this site. New and notable to Alaska SOS was collecting seed of *Vaccinium uliginosum* (bog blueberry). Berries were stored in plastic Ziploc type bags, then refrigerated before delivery to the PMC. Berries were delivered within 3 days of harvest to the PMC for processing. Future berry or fleshy fruit collections can follow this guideline, but the PMC advised that these types of materials be delivered within 10 days of harvesting. Integrity of the berry is not necessary because of the seed extraction process. Tracking the number of *V. uliginosum* plants collected from was difficult than other species because seed collectors were easily distracted with a highly desirable forage. One blueberry was estimated to have at least 10 seeds/berry at this site but sometimes up to 20 viable seeds were found in Eastern Interior region. While berry picker shovels were effective and efficient to collect a large number of berries, some collectors found it equally easy to use their hands. Collectors found it easiest to collect no more than 5 berries/plant before moving to the next plant. It was often the case where a *V. uliginosum* bush did not have more than 10 ripe berries, likely due to plant size.

The Kougarak road provided only a few accessible public lands sites with target species, namely Kougarak Bridge and Kougarak Landing Strip sites (Figure 3). In previous SOS years, collections originated on what are now Native owned lands or the BLM managed Salmon Lake recreation site. Tom Sparks, Nome Field Office Manager, asked that this area not have seed collecting activities as it was preferred for the area to have natural revegetation from the high public use of area. Several gravel extraction sites were found between Nome and the end of Kougarak Road, however the sites did not contain adequate populations to meet the SOS protocol. These rock quarries should be scouted again as conditions may change. Notable target species from Kougarak Road that will be particularly useful for revegetation needs include *Carex krausei*, *Silene involucreta*, *Calamagrostis canadensis*, *Deschampsia cespitosa*, *Bromus inermis* ssp. *pumpellianus*, *Astragalus eucosmus*, and *Trisetum spicatum*.

The final collecting day focused on the Teller Road since this road had significantly less public access. This road has a maritime influenced climate compared to the warmer inland climate of Nome-Council and Kougarak roads. We found the seed of many common species, such as *Carex aquatilis*, were not yet ripe for collection. Stormy, foggy weather also inhibited collecting and scouting from this roadway. However, four SOS collections were made at El Dorado Creek. Notable SOS collections from this site were *Artemisia campestris* ssp. *borealis* and *Chamerion latifolium*.

At Teller Road milepost 42.7, before Wesley Creek, we encountered an AK DOT gravel extraction site on the east side of the road. The source of the gravel extraction is exposed calcareous rubble on a hillside. In the Seward Peninsula, these outcrops are part of the Beringian Alpine Limestone Dryas Biophysical Setting, an Ecosystem of Conservation Concern, and are an uncommon geologic feature associated with rare plant habitat (Boggs et al 2016). During our survey we found a population of *Artemisia senjavinensis*, a BLM Sensitive Species and ranked S3 G3 (Figure 5). This is a particularly large population and had approximately 1,000 individuals between the two neighboring carbonate outcrops. The gravel extraction has eliminated approximately 25% of the

habitat for this population. In general the habitat was shale carbonate substrate on a backslope with 60% vegetation cover midslope transitioning to 10% vegetation cover to the peak of the hill and hoodoo formations. The vegetation was a *Dryas alaskensis*-lichen association with *Saxifraga oppositifolia*, *Carex bigelowii* ssp. *lugens*, and *Oxytropis nigrescens*.

Yukon-Tanana Uplands

Previous SOS collections for this region have occurred mid to late August with a mixture of ripe, unripe, or dispersed seed collecting stages. Seed collection from this region was later than previous efforts, yet yielded more available species and seed to collect. There were 25 collections from this region this season from seven site locations. Due to mining activity in riparian corridors, SOS collections concentrated on seral species for revegetation in mesic to wet habitats and collected from upland species when readily available and associated with riparian species. Nearly all SOS collections this season are SOS ‘workhorse species’ that are suitable for large scale increase.



Figure 5. Population of *Artemisia senjavinensis*, BLM Sensitive Species. Red circle shows one plant.

The Walker Fork Campground and Jack Wade Creek areas have provided numerous SOS collections the past several years (Figure 6). These easily accessible sites are riparian floodplains with anthropogenic disturbed areas. Notable collections for reclamation use this year include: *Carex saxatilis*, *Calamagrostis Canadensis*, *Deschampsia cespitosa*, *Carex aquatilis*, *Juncus castaneus*, *Beckmannia syzigachne*, *Alopecurus aequalis*, and *Festuca brachyphylla*. In previous collections years the *Beckmannia syzigachne* and *Alopecurus aequalis* had already dispersed or smaller amounts of seed were available in contrast to the abundant amount this season.

Just a few kilometers south of Chicken at the Mosquito Creek wayside, we collected seed from several species in a wet herbaceous sedge meadow surrounded by open *Picea glauca*. This site provided adequate quantities of grasses, sedges, and *Geum macrophyllum* var. *perincisum*. Adjacent to this site, a disturbed forb meadow road pullout has been in the process of being reclaimed by willows. However, this year, the 1-acre area was heavily disturbed from road building equipment and hunters parking vehicles. The habitat has been converted to disturbed overturned soil. This site was once the location of a *Gentianopsis barbata* ssp. *barbata* population, listed BLM Sensitive and ranked S3Q GNR. There was no evidence the species was still occurring and given the severity of the habitat disturbance, the population is likely extinct.

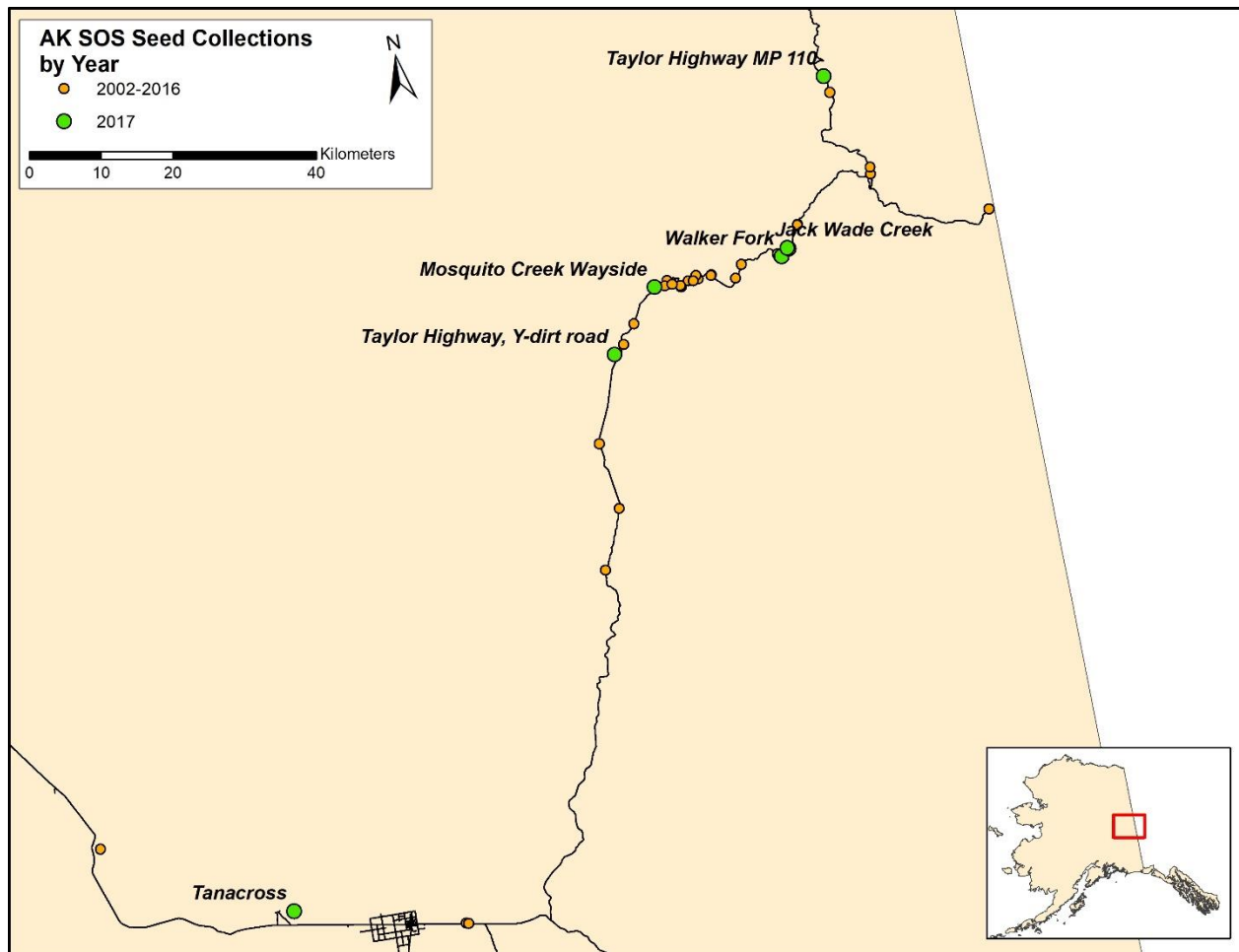


Figure 6. Locations of Yukon-Tanana Uplands 2017 SOS collections.

The Y-Dirt Road location is a recently burned spruce forest and an excellent site for *Vaccinium uliginosum* and *Elymus trachycaulus* ssp. *trachycaulus*. New locations were scouted on Taylor Highway, north of the junction with Top of the World Highway (Figure 6). Between this junction and the Fortymile River crossing, the highway traverses through dry alpine tundra and at tree line, allowing for easy collection of alpine species. Previous SOS collection sites no longer had target species or were heavily vegetated with non-target species. New locations with SOS target species such as *Festuca altaica*, *Trisetum spicatum*, *Chamerion angustifolium*, *Calamagrostis canadensis*, and *Calamagrostis purpurescens* had already dispersed seed. A seed collection of *Silene menziesii* ssp. *williamsii* occurred at milepost 110, on a steep eroded mountain side of exposed soil.

Conclusions

In total, SOS AK930 made 64 collections from 15 site locations for the 2017 field season. Collections were made in a variety of habitats ranging from arctic tundra, alpine disturbed areas, riparian corridors, wetland ponds, and forest edges. Seed collections targeted seral species and will be highly useful for reclamation efforts within respective regions. Seed was delivered to the Palmer Plant Materials Center. Herbarium voucher specimens have been dispersed to appropriate herbaria

and those held at UAAH are available online at www.pnwherberia.org. Invasive species presence and absence data were uploaded to AKEPIC.

Areas of BLM managed lands that have relatively few to no seed collections from include Denali Highway Tangle Lakes region, Dillingham area, Platinum Mine area, Bering Glacier, Nulato Hills area, the Dalton Highway between the Koyukuk River and Fairbanks, and Haines. Plant populations will be identified for future seed collection efforts and ACCS staff are working on plans for the 2018 field collecting season.

Literature Cited

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- Nowacki, G., P. Spencer, M. Fleming, T. Brock, and T. Jorgenson. 2001. Ecoregions of Alaska: 2001. U.S. Geological Survey Open-File Report 02-297 (map).

Table 1. Summary of SOS Collection in 2017.

SOS Col. Number	Species Name	Plant Family	Site Location	PMC Seedzone
AK930-782	<i>Eriophorum vaginatum</i>	Cyperaceae	Seward Peninsula	West
AK930-783	<i>Senecio pseudoarnica</i>	Asteraceae	Safety Sound Bridge	West
AK930-784	<i>Leymus mollis</i> ssp. <i>villosissimus</i>	Poaceae	Safety Sound Bridge	West
AK930-785	<i>Achillea millefolium</i> var. <i>borealis</i>	Asteraceae	Safety Sound Bridge	West
AK930-786	<i>Juncus arcticus</i> ssp. <i>alaskanus</i>	Juncaceae	Safety Sound Bridge	West
AK930-787	<i>Festuca rubra</i>	Poaceae	Safety Sound Bridge	West
AK930-788	<i>Carex gmelinii</i>	Cyperaceae	Safety Sound Bridge	West
AK930-789	<i>Honckenya peploides</i> ssp. <i>diffusa</i>	Caryophyllaceae	Safety Sound Bridge	West
AK930-790	<i>Chrysanthemum arcticum</i> ssp. <i>polare</i>	Asteraceae	Safety Sound Bridge	West
AK930-791	<i>Artemisia tilesii</i>	Asteraceae	Nome-Council Rd. mp 28.5	West
AK930-792	<i>Polemonium acutiflorum</i>	Polemoniaceae	Nome-Council Rd. mp 28.5	West
AK930-793	<i>Ligusticum scoticum</i> ssp. <i>hultenii</i>	Apiaceae	Nome-Council Rd. mp 28.5	West
AK930-794	<i>Calamagrostis canadensis</i>	Poaceae	Nome-Council Rd. mp 28.5	West
AK930-795	<i>Festuca rubra</i> ssp. <i>arctica</i>	Poaceae	Nome-Council Road mp 45.3	West
AK930-796	<i>Parnassia palustris</i>	Parnassiaceae	Nome-Council Road mp 45.3	West
AK930-797	<i>Chamerion latifolium</i>	Onagraceae	Nome-Council Road mp 45.3	West
AK930-798	<i>Juncus albescens</i>	Juncaceae	Nome-Council Road mp 45.3	West
AK930-799	<i>Wilhelmsia physodes</i>	Caryophyllaceae	Nome-Council Road mp 45.3	West
AK930-800	<i>Carex membranacea</i>	Cyperaceae	Nome-Council Road mp 45.3	West
AK930-801	<i>Solidago multiradiata</i> var. <i>multiradiata</i>	Asteraceae	Nome-Council Road mp 45.3	West
AK930-802	<i>Vaccinium uliginosum</i>	Ericaceae	Nome-Council Road mp 45.3	West
AK930-803	<i>Tofieldia pusilla</i>	Liliaceae	Kougarok Road mp 25.7	West
AK930-804	<i>Agrostis scabra</i>	Poaceae	Kougarok Rd. mp 25.7	West
AK930-805	<i>Carex aquatilis</i>	Cyperaceae	Kougarok Landing Strip	West
AK930-806	<i>Astragalus eucosmus</i>	Fabaceae	Kougarok Landing Strip	West
AK930-807	<i>Trisetum spicatum</i>	Poaceae	Kougarok Landing Strip	West
AK930-808	<i>Gentianella propinqua</i> ssp. <i>propinqua</i>	Gentianaceae	Kougarok Landing Strip	West
AK930-809	<i>Chamerion latifolium</i>	Onagraceae	Kougarok Landing Strip	West

SOS Col. Number	Species Name	Plant Family	Site Location	PMC Seedzone
AK930-810	<i>Silene involucrata</i>	Caryophyllaceae	Kougarok Landing Strip	West
AK930-811	<i>Carex krausei</i>	Cyperaceae	Kougarok Landing Strip	West
AK930-812	<i>Calamagrostis canadensis</i>	Poaceae	Kougarok Bridge	West
AK930-813	<i>Deschampsia cespitosa</i>	Poaceae	Kougarok Bridge	West
AK930-814	<i>Bromus inermis</i> ssp. <i>pumpellianus</i>	Poaceae	Kougarok Bridge	West
AK930-815	<i>Eurybia sibirica</i>	Asteraceae	Kougarok Bridge	West
AK930-816	<i>Chamerion angustifolium</i>	Onagraceae	Kougarok Bridge	West
AK930-817	<i>Artemisia campestris</i> ssp. <i>borealis</i>	Asteraceae	El Dorado Creek	West
AK930-818	<i>Chamerion latifolium</i>	Onagraceae	El Dorado Creek	West
AK930-819	<i>Carex membranacea</i>	Cyperaceae	El Dorado Creek	West
AK930-820	<i>Festuca rubra</i> ssp. <i>arctica</i>	Poaceae	El Dorado Creek	West
AK930-821	<i>Carex saxatilis</i>	Cyperaceae	Walker Fork	Interior
AK930-822	<i>Calamagrostis canadensis</i>	Poaceae	Walker Fork	Interior
AK930-823	<i>Poa glauca</i>	Poaceae	Walker Fork	Interior
AK930-824	<i>Deschampsia cespitosa</i>	Poaceae	Walker Fork	Interior
AK930-825	<i>Castilleja caudata</i>	Scrophulariaceae	Walker Fork	Interior
AK930-826	<i>Carex aquatilis</i>	Cyperaceae	Walker fork	Interior
AK930-827	<i>Agrostis scabra</i>	Poaceae	Walker Fork	Interior
AK930-828	<i>Juncus castaneus</i>	Juncaceae	Walker Fork	Interior
AK930-829	<i>Chamerion latifolium</i>	Onagraceae	Walker fork	Interior
AK930-830	<i>Beckmannia syzigachne</i>	Poaceae	Jack Wade Creek Gravel Pit	Interior
AK930-831	<i>Alopecurus aequalis</i>	Poaceae	Jack Wade Creek Gravel Pit	Interior
AK930-832	<i>Potentilla pensylvanica</i> var. <i>litoralis</i>	Rosaceae	Jack Wade Creek Gravel Pit	Interior
AK930-833	<i>Festuca brachyphylla</i>	Poaceae	Jack Wade Creek Gravel Pit	Interior
AK930-834	<i>Papaver nudicaule</i> ssp. <i>americanum</i>	Papaveraceae	Jack Wade Creek Gravel Pit	Interior
AK930-835	<i>Calamagrostis purpurascens</i>	Poaceae	Jack Wade Creek	Interior
AK930-836	<i>Geum macrophyllum</i> var. <i>perincisum</i>	Rosaceae	Mosquito Creek Wayside	Interior
AK930-837	<i>Carex utriculata</i>	Cyperaceae	Mosquito Creek Wayside	Interior
AK930-838	<i>Elymus trachycaulus</i> ssp. <i>trachycaulus</i>	Poaceae	Mosquito Creek Wayside	Interior
AK930-839	<i>Beckmannia syzigachne</i>	Poaceae	Mosquito Creek Wayside	Interior
AK930-840	<i>Carex aquatilis</i>	Cyperaceae	Mosquito Creek Wayside	Interior
AK930-841	<i>Achillea sibirica</i>	Asteraceae	Taylor Highway, Y-dirt road	Interior

SOS Col. Number	Species Name	Plant Family	Site Location	PMC Seedzone
AK930-842	<i>Elymus trachycaulus</i> ssp. <i>trachycaulus</i>	Poaceae	Taylor Highway, Y-dirt road	Interior
AK930-843	<i>Vaccinium uliginosum</i>	Ericaceae	Taylor Highway, Y-dirt road	Interior
AK930-844	<i>Silene menziesii</i> ssp. <i>williamsii</i>	Caryophyllaceae	Taylor Highway mile marker 110	Interior
AK930-845	<i>Arctostaphylos uva-ursi</i>	Ericaceae	Tanacross	Interior

Appendix A. Photos

Located on USB Device

Appendix B. Scanned Data Sheets

Located on USB Device