Summarized activities for the USDA-ARS National Plant Germplasm System Prosser, WA-based Temperate-adapted Forage Legume (TFL) germplasm collection.

- Personnel: A full-time Curator (Geneticist) is responsible for overall project implementation and for design of service and research activities. Project is also supported by a full-time USDA-ARS Biological Science Technician and one ½ time USDA/WSU Technician/Farmer as well part time Laborers throughout the year.

- Late 2017/early 2018 a ‘new’ Project Plan was developed and submitted for OSQR peer-review. This Project Plan is specific to the Temperate-adapted Forage Legume germplasm collection and outlines activities proposed for the next 5-year program cycle. Plan received a ‘minor revisions’ score and was certified on January 29, 2018. Project intends to focus resources on maintenance, documentation and distributions. As resources permit, possibilities exist to target germplasm for acquisition as well as several research objectives (see figure below for Project Plan specifics)¹.

- As part of the newly drafted project plan, collaborations were set up with several scientists at Arizona State University Polytechnic (Dr. Steele – Medicago spp.) and Loyola University Chicago (Dr. Laten – Trifolium spp.) and the University of Puerto Rico (Dr. Siritunga – Lotus spp.) to correctly voucher species and to examine possible mislabeling and/or misidentification in TFL germplasm using DNA barcoding. Dr. Melanie Schori, USDA-ARS systematist, is also aiding this collaborative effort.

- During the 2017 summer regeneration period, alfalfa (M. sativa subsp. sativa ‘Vernal’) sentinel plots (½ covered and ½ uncovered) were established around germplasm regeneration field plots to monitor adventitious presence of genetically engineered (GE) glyphosate trait in alfalfa germplasm. Using a glyphosate-amended seedling germination assay and a seed grinding technique more than 140,000 seed was tested from 13 plots. No AP was detected from any covered (insect proof cage covers) sentinel plots, however AP was detected in five of the uncovered plots. AP detection in uncovered sentinel plots suggests transgenic gene flow to regeneration field site and extreme care must be taken to ensure timely placement of cage covers for alfalfa regenerations.

- Low seed number and low viability inventories continue to accumulate, especially for wild clover species and some accessions have been lost. These difficult to regenerate accessions are being targeted systematically for regeneration utilizing an in vitro germination procedure followed by clonal propagation in greenhouses. The idea is to increase the low number of plants germinating in the laboratory to the optimal (100) needed for field establishment. Personnel understands that genetic erosion might be occurring due to the less-than-ideal effective population size, but must do everything possible to avoid losing accessions.

- A recent systematic review of the Lotus genus has reclassified former native North American Lotus species into two new genera: Acmispon and Hosackia. Therefore, the TFL project gained 19 Acmispon species with 63 accessions and 6 Hosackia species with

¹ Anyone interested in more details regarding Project Plan is welcome to contact me
14 accessions. The number of Lotus species/accessions was adjusted correspondingly.

- Project coordinated the field planting and harvest (regeneration) of 184 Medicago, Trifolium, Lotus (Acmispon/Hosackia) germplasm accessions during the 2017 growing season. Additionally, 50 Medicago, Trifolium and Lotus species germplasm accessions were planted in the fall to be overwintered and regenerated CY 2018. The regeneration field site also included 10 sentinel plots and one faba bean (Vicia faba) accession.
- Project personnel were involved in the collection and scanning of 143 flower images for accessions being regenerated in 2017 as well as 173 seed and 109 pod voucher images for 2016 regenerated accessions. These images will be included in the GRIN-Global database and associated with corresponding accessions.
- During FY 2017 project coordinated the distribution of a total of 180 (174\(^2\)) requests from 154 (142) cooperators (135 U.S./19 Int.). The number of unique accessions distributed was 3,222 (2,052) and total number of items distributed was 4,407 (3,243).
- Significant distributions during the FY were made to National and International requestors associated with Governmental, Private and Non-profit organizations. These genetic resources were used mostly in breeding and varietal development using traditional and genomic techniques, screening for disease resistance and abiotic stresses, screening for use as a cover crop, companion or in rotation, chemical analyses, phylogenetics, phytoremediation, class instruction and basic research (especially for model species - e.g., M. truncatula).

### Table 1. Summary statistics for the Temperate-adapted Forage Legumes (TFL) collections conserved by the Western Regional Plant Introduction Station (WRPIS) of the NPGS.

<table>
<thead>
<tr>
<th>Genus</th>
<th>Acc.(^a)</th>
<th>Spe.(^a)</th>
<th>Ava.(^a)</th>
<th>Bac.(^a)</th>
<th>Inc.(^b)</th>
<th>Dis.(^b)</th>
<th>Acq.(^b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicago</td>
<td>8,614</td>
<td>79</td>
<td>7,715</td>
<td>7,735</td>
<td>80</td>
<td>3,125</td>
<td>1</td>
</tr>
<tr>
<td>Trifolium</td>
<td>3,736</td>
<td>99</td>
<td>2,680</td>
<td>2,779</td>
<td>65</td>
<td>1,148</td>
<td>6</td>
</tr>
<tr>
<td>Lotus</td>
<td>920</td>
<td>40</td>
<td>767</td>
<td>736</td>
<td>39</td>
<td>134</td>
<td>3</td>
</tr>
<tr>
<td>Acmispon</td>
<td>63</td>
<td>18</td>
<td>51</td>
<td>48</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Hosackia</td>
<td>14</td>
<td>6</td>
<td>9</td>
<td>11</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>13,347</td>
<td>242</td>
<td>11,222</td>
<td>11,309</td>
<td>184</td>
<td>4,407</td>
<td>12</td>
</tr>
</tbody>
</table>

**Legend:** Acc. = Accession; Spe. = Species; Ava. = Available; Bac. = Backup; Inc. = Increased; Dis. = Distributed; Acq. = Acquired; Rec. = Records (Observation records added to GRIN-Global).\(^a\) Information verified on 10/16/2017.\(^b\) Data summarized for the 2017 FY.

**Seeds of Success (update).** The Seeds of Success program is BLM-led multi-organizational cooperative effort for the collection and long-term conservation of populations of native plant taxa important to landscape restoration and agricultural production. It is an effort established in 2001 and has amassed more than 23,000 collections. Of these, close to 16,000 have been received and included in the NPGS collections at primary sites around the nation or held in the ‘native’ collection cohort at the WRPIS. Collection efforts will continue into the foreseeable future with a greater focus on representation from the eastern U.S. states and on the inclusion of crop wild relatives.

\(^2\) Numbers in parenthesis are for FY 2016 and used for comparison.
Figure 1. Project plan objectives, key products, and their interactions. To effectively and efficiently conserve germplasm and encourage its use (Objective 1), germplasm must be characterized/evaluated and its data be accessible (Objective 2) with routine revision of standard procedures and crop vulnerabilities to improve conservation strategies (Objective 3).
Figure 2. Monitoring for gene-flow and adventitious presence of genetically engineered (GE) glyphosate resistance in and around alfalfa regeneration plots in Prosser, WA. **Left:** Alfalfa hay field close to the regeneration site with feral glyphosate resistant plants between road and field (inset - plants testing positive for the glyphosate resistant GE trait with immuno-strips). **Right:** Field regeneration plot map indicating five alfalfa sentinel plots (red circle). Seed from sentinel plots is tested for gene-flow and adventitious presence at the end of the growing season.

Figure 3. Summer morning image of regeneration field site with isolation cages (**right**) and (**left**) example of leaves, pods and seed for a regenerated *M. polymopha* accession.