**PROJECT TITLE: Preserving and Learning from Minnesota’s Native Orchids**

**I. PROJECT STATEMENT**

Minnesota has 48 species of native orchids. This third phase of the University of Minnesota Landscape Arboretum (MLA) project will continue conservation of these important and endangered species by:

1. **Expanding banking, propagation and display** efforts by 15 species to a total of at least **40 species**.
2. **Expanding collection efforts of 25 Phase 1 and 2 species** at new locations to continue to diversify banked genetics beyond the baseline 3 populations per species.
3. Implementing a pilot curriculum to **bring orchids to 10 classrooms across MN** – teaching students the scientific method and appreciation for Minnesota’s natural world, and interacting with MLA scientists.

Ten orchid species are on the Minnesota’s List of Endangered, Threatened, and Special Concern Species and the number of species on this List is likely to increase in the near future. The Native Orchid Conservation Program (NOCP) at MLA was established in 2015, in large part due to ENRTF M.L. 2015 funding. Phases 1 and 2 of this program have been laying the groundwork to protect these jewels of Minnesota’s flora by (a) creating a genetically diverse bank of seed and/or live plants for 25 species of orchid from across Minnesota and (b) researching propagation and cultivation methods for nearly two-thirds of the 48 species. Our efforts have been increasingly recognized and we are leveraging that recognition to diversify our financial support and collaborations. We have refined and advanced protocols for almost half of our species and now are able to share our findings with other researchers. Fungal symbionts are necessary for orchid survival in the wild and we have identified, propagated and banked root-based symbionts for MN orchids in partnership with the North American Orchid Conservation Center (NAOCC) and Dr. Jyotsna Sharma at Texas Tech University (TTU).

NOCP research and developments have led to the establishment of a near-comprehensive orchid conservation program. Our goal is to create a program that is equipped to preserve all Minnesota-native orchid species and has infrastructure to assist groups with local protection and restoration. A seed bank is not only a genetic ark for rare plants but a tool for conservation, education and research. To that end, NOCP is partnering with MLA’s Education Department and the Smithsonian Environmental Research Center to implement a pilot curriculum that would bring orchid propagation science to grade school classrooms for hands-on learning. We will use NOCP’s success to bring exciting and applicable scientific research and education to classrooms state-wide. In an increasingly digital age, it is critical to offer children opportunities to develop critical thinking skills and an ethic of responsibility for their world. These in-class greenhouse experiments will connect students to a fascinating part of their natural heritage. This experience will encourage some students to become future scientists, and enable all to make clear-eyed choices about the environment and their relationship to it as they grow.

**II. PROJECT ACTIVITIES AND OUTCOMES**

**Activity 1: Expand banking/preservation efforts to at least 40 species Budget $209,681**

MLA will expand banking efforts to 40 species, continuing on the past success of the program. Seeds are banked at the MLA long-term seedbank; roots are sent to TTU for fungal identification and NAOCC for fungal banking. Staff will travel to multiple sites throughout the growing season to collect data, seeds and root samples.

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| **Outcome** | **Completion Date** |
| *1. Finalize list of 15 target species and sites for banking efforts* | *December 2020* |
| *2. Complete root sampling for fungal-associate banking for at least 40 orchid species.* | *June 2023* |
| *3. Complete seed bank collection from 3 populations for each of the 15 Phase 3 species.* | *June 2023* |
| *4. Increase range coverage for Phase 1 and 2 species, banking from edge-of-range.* | *June 2023* |

**Activity 2: Continue propagation and cultivation research Budget $181,098**

Propagation lab and greenhouse work will increase to encompass all 48 of Minnesota’s native orchid species. In addition, MLA staff will extract and propagate orchid root fungal species and will begin using these fungi for both propagation and establishment of orchids in pots/garden plots. As we refine techniques and propagation methods for each orchid species, we will also develop production-level protocols and infrastructure with the intention that for all species we will be able to produce sufficient material to be useful in reintroductions when requested by organizations such as MN DNR or The Nature Conservancy.

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| **Outcome** | **Completion Date** |
| *1. Complete collection of seed from all 48 species for propagation purposes.* | *December 2020* |
| *2. Develop fungal extraction and inoculation techniques for 15 species of orchids.* | *June 2023* |
| *3. Develop and publish a propagation manual covering 20 of Minnesota’s native orchids* | *June 2023* |

**Activity 3: Develop educational research program for 7th grade science classrooms Budget $165,321**

To facilitate research-based science learning, we will place fluorescent light shelves with orchid seedlings in middle school classrooms. Trained teachers will oversee weekly data measurements taken by students - with programming on scientific method, plant anatomy, and critical thinking as well as introduce a conservation ethic, promoting interaction and appreciation of native plants, and fulfilling MN 7th Grade Life Science Standards related to Scientific Inquiry (7.1.1.1.2, 7.1.1.2.1, 7.1.1.2.2) and Natural Systems (7.4.2.1.3) in science curricula. Students from 23 classrooms over three years will interact with MLA scientists and other schools, including other schools around the country performing similar experiments, sharing and analyzing data together.

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| **Outcome** | **Completion Date** |
| *1. Host a training session with Smithsonian staff for selected Twin Cities metro area participating teachers/schools. (3 schools)* | *Summer 2020* |
| *2. Establish programs in each school, providing equipment, supplies and orchids.* | *Fall 2020* |
| *3. Evaluate first year with participating schools and teachers.* | *Summer 2021* |
| *4. Introduce programs to 10 schools (including outstate MN) and follow for two years.* | *Fall 2021* |

**III. PROJECT PARTNERS AND COLLABORATORS:** Minnesota Landscape Arboretum\*; Dr. Jyotsna Sharma, and Texas Tech University; Smithsonian; North American Orchid Conservation Center. *\* receiving LCCMR funds*

**IV. LONG-TERM IMPLEMENTATION AND FUNDING:** MLA remains committed to both the Plant Conservation Program and the Native Orchid Conservation Program and is developing independent funding to support banking and conservation research, with several organizations providing increasing grant money to fund research or production of orchids for restoration. A conservation seed bank such as the orchid seed bank at MLA is a long-term commitment and needs both staff and infrastructure support and MLA continues to provide both. Education is a core mission of MLA as such, connecting our conservation research to Minnesota schools is a vital part of this mission. Increasing a sense of stewardship and appreciation for the natural world in Minnesota’s future scientists and leaders will be important for responsible management of all of the state’s natural resources.

**V. SEE ADDITIONAL PROPOSAL COMPONENTS:** A. Proposal Budget Spreadsheet, B. Visual Component or Map, F. Project Manager Qualifications and Organization Description