**SPU Internal Grant Interim[1] or Final Grant Report[2]**

**Academic Year & Type of Grant (FRG, SERVE or Innovation): 2014-2015 FRG**

**PI Name (and Co-PI's): Dr. Cara Wall-Scheffler and Dr. Eric Long**

**Original Title of the Proposal: *Why so small? Heterochrony in tooth development as evidence for a life history shift among Blakely deer***

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The Final Project Report must briefly address the following in 1-2 pages:

1. Summarize the project goals and the activities that took place to meet those goals during the grant period. Note who was involved and if anyone was an SPU student.

   The goals of this project were (1) to investigate potential island dwarfism and heterochrony (i.e., delayed development in the absence of predators) of black-tailed deer on Blakely Island, and (2) to document sex- and age-structure demographics of this population. This ongoing project is a collaborative effort led by Dr. Cara Wall-Scheffler and Dr. Eric Long. Beginning in summer 2014, 5 SPU undergraduate biology students have worked on this project, including Rebecca Pedersen, Luke Arnold, Morgan Hasegawa, Andrew Kerlee, and Bree Ferguson.

2. What were the major findings? If there are no findings or completed work at this time, what did you learn from carrying out this project that could be applicable to future scholarly works?

   While this project is ongoing, preliminary analysis suggest that, consistent with the predictions of island dwarfism, deer do develop more slowly on Blakely Island. This is a fitness increasing strategy in the absence of predators. When forage is poor and risk of predation is absent, organisms can take longer to develop without risking increased threat of predation associated with small body size. Secondly, we have documented a skewed sex ratio of adults (2.05 F:M), and high juvenile mortality (47.3%), likely related to poor quality forage. Of those that survive through the first year of life, most live to 5-6 years old, and maximum documented lifespan is 12.

3. How were or will the results be disseminated (publication, presentation, creative work, etc. – be as specific as possible)? Please add an addendum or link to completed projects or provide a time-line for future dissemination.

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[1] Faculty with a multiple year grant or asking for an extension or reallocation of their grant monies must complete as much of this form as possible as an interim grant report before multiple year disbursement, extension or reallocation can occur.

[2] When electronically submitting your report to CSFD, please cc: your chair and/or dean (whomever received your original grant notification).

These findings have been presented at the 2015 SPU Erickson Undergraduate Research conference:

- Hasegawa, M.*, A. Kerlee*, B. Ferguson*, E.S. Long, and C.M. Wall-Scheffler. Molar parameters for age approximation of black-tailed deer (*Odocoileus hemionus columbianus*) on Blakely Island, WA. Poster presentation at Erickson Conference for Undergraduate Research. Seattle Pacific University, Seattle, WA, 2015.
- Arnold, L.A.*, E.S. Long, and C.M. Wall-Scheffler. Survivorship and developmental timing of black-tailed deer on Blakely Island. Oral presentation at Erickson Conference for Undergraduate Research. Seattle Pacific University, Seattle, WA, 2015.

Additionally, preliminary findings will be presented in fall 2015 at the national, annual conference of The Wildlife Society.

- Long, E.S., L.A. Arnold*, R.L. Pedersen*, Z.M. Wilson*, and C.M. Wall-Scheffler. Age and sex structure of a high density, island population of black-tailed deer. 22nd Annual Conference of The Wildlife Society. Alberta, CA. Oct 2015 (scheduled; *undergraduate student).

When analyses are complete, we will prepare findings for publication in a peer-reviewed journal.

4. What future scholarly works will be related to this project?

   Using supplies bought with the FRG, at least three additional SPU undergraduates will continue data collection and analyses during the 2015-2016 school year.

5. Is there external funding that you would like to pursue with the Office of Sponsored Programs?

   None identified at this point.

6. Did you run into any problems or difficulties in completing the project? How were these resolved?

   We did not run into any substantial problems in completing this project. Dr. Long had already collected > 400 deer skulls prior to the grant application, and Dr. Wall-Scheffler has substantial experience with dental analyses. The equipment necessary for tooth extraction and slide mounting had already been installed in their shared research space.

7. If you had student participation – how did participation in this project further their professional goals or vocational understanding?

   Five SPU undergraduates have already completed their undergraduate research requirements (BIO 4978 & 4979) through this project, and we anticipate at least 3 additional students will be served by this project in 2015-2016. As demonstration of undergraduate research is highly desirable to graduate schools and future employers, this project certainly enhanced the “marketability” of these students. Additionally, student co-authorship on academic presentations and any forthcoming publications will also enhance their CV’s.