

**FEDERAL AID
INTERIM PERFORMANCE REPORT**

ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF WILDLIFE CONSERVATION
PO Box 115526
Juneau, AK 99811-5526

**Alaska Department of Fish and Game
State Wildlife Grant**

Grant Number: T-16 **Segment Number: 1**

Project Number: 3.0

Project Title: Effects of forestry practices on ecological indicator species.

Project Duration: May 1, 2010 – June 30, 2014

Report Period: May 1, 2012 – April 30, 2013

Report Due Date: September 1, 2013

Principle Investigator: Derek S. Sikes

Project Location: Statewide: University of Alaska Museum, Fairbanks.

**I. SUMMARY OF WORK COMPLETED ON JOBS FOR LAST SEGMENT
PERIOD ONLY**

Objectives: This proposal seeks funding to investigate the relationships between different forestry thinning practices in the Tongass National Forest on Prince of Wales Island and terrestrial arthropod biodiversity using beetles and spiders as indicator groups. Specifically, this project will coordinate with a project being conducted by Drs. Elizabeth Flaherty and Merav Ben-David and funded by the U.S. Forest Service (USFS) that is focused on the response of small mammals to these different thinning practices. In addition to (1) an assessment of arthropod variation by forestry practice and (2) a baseline species-level inventory for a poorly documented region, these arthropod data (3) will be jointly analyzed with the small mammal data, in collaboration with Drs. Flaherty and Ben-David, yielding powerful, multi trophic-level knowledge of this system.

Investigation of the relationships between different forestry thinning practices in the Tongass National Forest on POW and terrestrial arthropod biodiversity using beetles and spiders as forest health indicator groups.

1. Establish a baseline faunal inventory for these hyperdiverse but poorly known animal groups for Prince of Wales Island.

- 1a. Collect terrestrial arthropods using methods detailed below.

Accomplishments: Analyses based on two years' data began in summer 2013. Four field seasons of four planned have been completed. Specimens from three field seasons (2010&2011&2012) have been processed. Specimens from the fourth field season (2013) will be processed during the academic year 2013-2014.

Survey work has found four species, all wingless, that are new records for Alaska and suggestive of past glacial refugia on Prince of Wales Island: *Pristoceuthophilus cercalis* Caudell (a cricket, first record of this suborder for Alaska); *Caurinus* sp. (a new species of boreid Mecopteran, first record of this genus for Alaska), *Campodea* sp. an as yet unidentified dipluran (a first record of this order for Alaska), and an as yet unidentified symphylan (a garden centipede, first record of this order for Alaska). Genetic work on the new *Caurinus* supported our hypothesis that it is a new species. The PI, Derek Sikes, and the MS student, Jill Stockbridge, published a peer-reviewed paper in the journal ZooKeys describing this new *Caurinus*, naming it *C. tlagu*.

Sikes, D. S. and Stockbridge, J. 2013. Description of *Caurinus tlagu*, new species, from Prince of Wales Island, Alaska (Mecoptera, Boreidae, Caurininae). ZooKeys 316:35-53. (doi: 10.3897/zookeys.316.5400)

The MS student on the project, Jill Stockbridge, has completed all four planned field seasons and done an excellent job processing specimens in the lab. Four University of Alaska undergraduates, Casey Bickford (2010), Chen Wong (2011), Sarah Meierotto and Ian MacDougall (2012) have been trained as field technicians. The final field season was managed by former MS student of the PI, Jozef Slowik.

1b. Identify beetles and spiders to lowest possible taxon (typically species) store all by-catch (non-target) taxa in bulk samples for future processing.

Accomplishments: Processed to date: 20,931 specimens /lots from 2010-2012 representing 433 putative beetle and spider species, including some misc. taxa such as Diptera (flies).

1c. Provide archival storage for these specimens to ensure their long-term availability to science.

Accomplishments: All processed specimens or lots have been assigned barcode labels and have corresponding records in our museum database. All have been archived in a manner to ensure their long-term availability to science.

1d. Provide online, publicly available data for all voucher specimens.

Accomplishments: Earlier than anticipated, online public data for this project are now available via the University of Alaska Museum's database Arctos: <http://arctos.database.museum/saved/ADFG-POW>

2. Determine how beetle and spider richness and diversity vary with forest treatment.

2a. Compare beetle and spider richness and diversity across forest treatments.

Accomplishments: Preliminary analyses of the first two years of these data have been performed. This analysis will form the basis of graduate student, Jill Stockbridge's MS thesis. These results indicate that the species richness and diversity of beetles shows a different pattern than that of spiders. Spider assemblages from all habitats (old growth, thinned secondary growth, clear cuts,

and un-thinned secondary growth) were all significantly different from each other except for old growth and secondary growth. Beetle assemblages from thinned treatments were not significantly different from old growth, clear cuts, and un-thinned secondary growth. However, beetle assemblages from old growth, clear cuts, and un-thinned secondary growth were all significantly different from each other.

2b. Identify forest treatments which best correlate with arthropod community variables unique to old growth stands.

Accomplishments: Preliminary results indicate there was not a particular thinned treatment that best correlated with the arthropod community of old growth stands.

2c. Identify particular indicator taxa for future forest management assessment?

Accomplishments: Beetle and spider taxa strongly associated with each habitat type were identified. These are:

Spiders:

- Species associated with Old Growth and 2nd Growth:
 - *Erigoninae sp.1*
 - *Lepthyphantes zibus*
 - *Symmigma minimum*
- Species associated with Clear Cuts:
 - *Pardosa dorsuncata*
 - *Robertus vigerens*
 - *Sisicottus nesides*
- Species associated with Thins:
 - *Agyneta sp.1*
 - *Centromerus nr. longibulbus*
 - *Pocadicnemis pumila*
 - *Usofila pacifica*

Beetles:

- Species associated with Old Growth:
 - *Cryptophagus sp.*
 - *Dictyoptera simplicipes*
 - *Rhinosimus viridiaeneus*
 - *Rhizophagus sculpturatus*
 - *Scaphinotus angusticollis*
 - *Scydmaeninae sp.1*
- Species associated with Clear Cuts:
 - *Ampedus carbonicolor*
 - *Ditylus gracilis*
 - *Listemus acuminatus*
 - *Pelecomalium sp.*
 - *Punicealis hamata*
 - *Rhyncolus brunneus*

- Species associated with 2nd Growth:
 - *Lederia arctica*
 - *Pseudohylesinus sp.*
 - *Pterostichus castaneus*
 - *Pterostichus crenicollis*
 - *Scydmaeninae sp.2*
 - *Scydmaeninae sp.3*
 - *Sonoma sp.*
 - *Staphylinidae sp.15*

3. In collaboration with Drs. Flaherty and Ben-David determine if beetle and spider richness and diversity vary with small mammal abundance and vital rates.

Accomplishments: We have yet to coordinate analyses with the mammal team.

4. Specifically test the following hypotheses (note some are contradictory):

4a. Old growth stands will have greater arthropod diversity and abundance relative to all thinned treatments (Willett 2001, Dollin et al., 2008).

Accomplishments: Preliminary results indicate old growth stands did not have a significant difference in spider and beetle diversity and species richness when compared to all thinned treatments. Old growth had a higher species richness than un-thinned secondary growth.

4b. Logged stands will have higher arthropod diversity (Pohl et al. 2008) and species richness (Klimaszewski et al. 2008) than old growth stands.

Accomplishments: Preliminary results indicate logged stands did not have a significant difference in spider and beetle diversity and species richness when compared to old growth stands. Clear cuts had a higher species richness than un-thinned secondary growth.

4c. Habitat specialists will be identified that persist only in old growth stands (Willett 2001).

Accomplishments: Preliminary results indicate there were not any beetles or spiders found that only persisted in old growth stands.

4d. Unique community assemblages composed of a mix of forest and open-ground specialists will be found in thinned and cut treatments (Pohl et al. 2008).

Accomplishments: Preliminary results indicate thinned treatments resembled a mixed arthropod community where the thinned sites shared species from old growth, clear cuts, and un-thinned secondary growth.

4e. Stands with smaller and more numerous gaps will be more similar to old growth than heavily thinned stands, stands with larger but fewer gaps, or clearcut stands (Klimaszewski et al. 2008).

Accomplishments: With only two replicates per thinned treatment and having six replicates for old growth, clear cuts, and secondary growth, we combined the three treatments in order to increase statistical power. Therefore, I was not able to determine if there were any differences between different thinned treatments.

II. PUBLICATIONS

One peer-reviewed publication:

Sikes, D. S. and Stockbridge, J. 2013. Description of *Caurinus tlagu*, new species, from Prince of Wales Island, Alaska (Mecoptera, Boreidae, Caurininae). *ZooKeys* 316:35-53. (doi: 10.3897/zookeys.316.5400)

(See associated PDF)

One editor reviewed publication by Jill Stockbridge:

Stockbridge, J. 2011. Beetles and spiders as indicators of forest recovery on Prince of Wales Island, Alaska. *Newsletter of the Alaska Entomological Society* 4(1): 1-3.

A presentation titled “Effects of different logging practices on the beetles and spiders on Prince of Wales Island, Alaska” at the 4th annual meeting of the Alaska Entomological Society by Jill Stockbridge took 2nd place in the student competition.

A presentation titled “Beetles and Spiders as Indicators of Forest Recovery on Prince of Wales Island, Alaska” at the National meeting of the Entomological Society of America (>3,000 participants) by Jill Stockbridge took 2nd place in the graduate student competition (Nov 2013).

Prepared by: Derek Sikes & Jill Stockbridge

Date: 4 Dec 2013