

**ANNUAL REPORT: June 1, 2016 – May 31, 2017**  
**(i.e., Summer 2016, AY 2016-2017)**  
**DEPARTMENT OF ENVIRONMENTAL AND FOREST BIOLOGY**  
**SUNY-ESF**

**\*\*\*PLEASE DO NOT INSERT TABLES FOR ANY CATEGORIES\*\*\***

NAME: Brian Leydet

**I. INSTRUCTIONAL ACTIVITIES**

1. Regular Course Offerings

	<u>Course No.</u>	<u>Title</u>	<u>Credit Hrs.</u>	<u>No. Students</u>	<u>No. of Lab. Sections</u>
SUMMER:					
FALL:					
	<b>EFB 360</b>	<b>Epidemiology (new prep)</b>	<b>3</b>	<b>11</b>	<b>0</b>
SPRING:					
	<b>EHS 320</b>	<b>Disease Prevention (new prep)</b>	<b>2</b>	<b>28</b>	<b>0</b>

**NOTE: PLEASE INDICATE WHICH COURSE(S) HAD A SERVICE-LEARNING COMPONENT AND BRIEFLY EXPLAIN THE NATURE OF THIS COMPONENT.** For examples of service-learning in courses, see: <http://www.esf.edu/students/service/courses.htm>. Service-learning is a form of structured experiential education in which students engage with the community to be active learners, to enrich their sense of civic responsibility, and to explore practical application for course content. Faculty oversight, reflective thinking, and reciprocity are key components of service-learning.

2. Non-Scheduled Course Offerings (e.g., 496, 899, 999)

	<u>Course No.</u>	<u>Title</u>	<u>Credit Hrs.</u>	<u>No. Students</u>
<b>Spring 2017</b>				
	<b>EFB 498</b>	<b>Independent Research/Envrn Bio</b>	<b>2</b>	<b>1</b>
	<b>EFB 498</b>	<b>Independent Research/Envrn Bio</b>	<b>3</b>	<b>1</b>

3. Continuing Education and Extension (short courses, workshops, etc.)

- Invited Speaker for Heart of New York chapter for the Association for Professionals in Infection Control and Epidemiology 14<sup>th</sup> Annual Teaching Day, March 30, 2017. Verona NY. *Tick-Borne Diseases A Growing Public Health Threat*. (170 attendees)
- Invited Speaker for Upstate Medical University, Department of Medicine, Infectious Disease Grand Rounds, September 27, 2016. Syracuse NY. *Addressing Knowledge Gaps in Lyme Disease*. American Medical Association Physician's Recognition Award 1 Credit. (20 attendees)
- Invited Speaker for Alliance Counties Public Health Conference, August 18, 2016. Syracuse NY. *Tick-borne disease update: Borreliosis including B. miyamotoi and B. mayonii*. (40 attendees)

#### 4. Guest Lecture Activities

<u>Course No.</u>	<u>Title</u>	<u>No. of Lectures</u>
<b>EFB 453</b>	<b>Parasitology</b>	<b>1</b>
<b>EFB 303</b>	<b>Introductory Environmental Microbiology</b>	<b>1</b>

## II. **STUDENT ADVISING**

- A. Number of undergraduates for whom you are the student's official advisor 8 and unofficial advisor 1
- B. Graduate Students: (list name, degree sought, starting date, month & year; if a degree was completed, please give date and full citation for the thesis or dissertation).

### MAJOR PROFESSOR

### CO-MAJOR PROFESSOR

### MEMBER, STEERING COMMITTEE (other than those listed above)

1. Shannon Peterson (EFB, Ph.D. MP Teale)

### CHAIRMAN OR READER ON THESIS EXAMS, ETC.

1. Samantha Mello (EFB, M.S., examiner MP's Cohen & Whipps)
2. Lorne Farovitch, (PhD student, MP Dr Tim Dye) University of Rochester Department of Translational Biomedical Science, Spring/Summer 2016

## III. **RESEARCH COMPLETED OR UNDERWAY**

### A. Departmental Research (unsupported, boot-legged; title - % time spent)

1. The role of *Borrelia burgdorferi* pleomorphic forms in tick transmission and perpetuation (boot-legged 5%)
2. Serosurvey for exposure to tick-borne diseases in febrile patients from Ecuador (boot-legged 2%)
3. Defining the *Borrelia burgdorferi* RPON regulon using a novel molecular roadblock (boot-legged, <1%)

### B. 1. Grant-supported Research (source, subject, amount - total award and current year, award period starting and ending dates; list graduate research assistants supported by each grant)

1. **Leydet BL.** SUNY-Center for Applied Microbiology, Studying *in vivo* gene expression of the tick-borne pathogen *Borrelia burgdorferi* via enrichment of pathogen specific RNA transcripts from host tissues by micro-column capture and RNA-Seq. (April 2017 – Sept 2017) - \$7,184.
2. **Leydet BL, Farrell J.** Great Lakes Research Consortium. Influence of Spawning and Nursery Habitat in Shaping the Northern Pike (*Esox lucius*) Gut Microbiome. (3/1/17 – 12/31/19) - \$22,500

Partial Support: MS student (to be recruited)

2. Research Proposals pending (include information as in B.1., above).
1. **Leydet BL.** USDA-CREES/McIntire-Stennis Program *Ixodes scapularis* Invasion into the Adirondack Park Preserve: Host Associations and Their Influence on Lyme Disease Emergence. (Selected for Funding) (8/15/2017 – 9/30/2017) \$60,404. Support: Incoming MS student Sarah Lanthier
3. Research Proposals submitted, but rejected (include information as in B.1., above)
1. **Leydet BL, Nomura CT.** DOD Congressionally Directed Medical Research Program (CDMRP) Idea Award Using Pathogen Transcript Capture and RNA-Seq to Identify Genes Essential for *Borrelia Burgdorferi* Transmission and Pathogenesis in a Tick-murine Infection Model. (07/01/2017 – 06/30/2019) \$381,751.
2. **Leydet BL, Nomura CT.** NIH NIAID Novel Approaches to Understanding, Preventing, and Treating Lyme Disease and Tickborne Coinfections R21. Using Capture-Based Pathogen Transcript Enrichment and RNA-Seq to Identify Genes Essential for *Borrelia burgdorferi* Survival, Transmission, and Pathogenesis in a Tick-Murine Infection Model. (07/01/2017 – 06/30/2019) \$416,544.
3. **Leydet BL.** Bay Area Lyme Foundation Emerging Leader Award. Identification and Development of Species Specific Diagnostic Markers for North American *Borrelia Burgdorferi* Senu LatoSpriochetes. (07/01/2017 – 12/31/2018) \$99,188. **\*(Will be contacted about funding outside of this call for proposals.)**

**IV. PUBLICATIONS** (Full bibliographic citation, i.e., do not use "with Jones," or "Jones, et al."; please list only publications published, in press, or actually submitted during this reporting period --- **do not list manuscripts in preparation**).

A. Refereed Publications

B. Non-refereed Publications

C. Papers Presented at Science Meetings (give title, date, occasion, and location)

Student and co-authored presentations (presenter underlined)

1. April 25, 2017. SUNY-ESF Spotlight on Student Research, Syracuse, NY. *Monitoring Phenotypic Transitions of Borrelia burgdorferi Under Normal and Nutrient Limiting Conditions* Christiano, A., **Leydet, B.L.**
2. April 25, 2017. SUNY-ESF Spotlight on Student Research, Syracuse, NY. *Quantifying Borrelia burgdorferi biofilm formation in vitro* Sorlie, A.M., **Leydet, B.L.**

D. Public Service Presentations (lectures, seminars, etc. to and for the public; give group or occasion, date(s), and attendance)

- Interviewed on LocalSYR News Channel 9 for “Some ticks found to carry virus worse than Lyme disease” story. May 03, 2017
- Interviewed by Syracuse NCC News for article “Increased Chances of Lyme Disease This Season”. April 18, 2017

- Interviewed by WAER for article “Heading Outdoors? SUNY ESF Professor Offers Tick and Lyme Disease Tips as Warmer Temps Settle in”. April 14, 2017

**V. PUBLIC SERVICE**

A. Funded Service (include consulting activities)

1. Government Agencies (Federal, State, Local):
2. Industrial and Commercial Groups, etc.

B. Unfunded Service to Governmental Agencies, Public Interest Groups, etc.

- Judge for the 2017 Environmental Challenge, May 23<sup>rd</sup> Syracuse NY

**VI. PROFESSIONAL DEVELOPMENT**

A. Professional Honors and Awards (for teaching, research, outreach, etc.)

- B. 1. Activities in Professional Organizations (offices held, service as chairman, member, participant or consultant)
2. Professional Society Membership
3. Other Professional Activities

a. Editorial activity

<u>Journal (s)</u>	<u>Responsibility</u>
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Other (books, symposia, etc.)

b. Reviewer

<u>Journal(s)</u>	<u>No. of manuscripts</u>
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Acarina	1
BMC Microbiology	1
Fatigue: Biomedicine, Health & Behavior	1
Journal of Medical Entomology	3
New Microbes and New Infections	1
North Carolina Journal of Medicine	1
PeerJ	<u>1</u>

Total= 9

Agency

No. of proposals

Other

c. Participation (workshops, symposia, etc.)

	<u>Name of workshop, etc.</u>	<u>Date</u>	<u>Place</u>
1.	SUNY-ESF 9 <sup>th</sup> Annual Biotechnology Symposium • Plenary Panel Member: <i>Addressing infection challenges to public health-from problem identification to treatment</i>	May 18, 2017	Syracuse, NY
2.	Cornell EvoDay Symposium • Attendee	May 11, 2017	Ithaca, NY

C. Further Education/Re-training Undertaken, Leaves, Workshops, etc.

D. Foreign Travel (Where, When, Purpose)

## VII. ADMINISTRATIVE AND SERVICE RESPONSIBILITIES (include committee participation)

A. Department-level

- Environmental Toxicologist Search Committee, Spring 2017
- Participated in Accepted Student Receptions, March & April 2017

B. College-level

- SUNY-ESF Institutional Biosafety Committee (IBC), Founding Member
- Assisted in writing a funded SUNY Empire Innovation Program Grant- Joint submission with SUNY-Upstate (\$1,500,000, ESF award: \$600,000)

C. University-wide, including Research Foundation

## VIII. SUMMARY OF SIGNIFICANT ACTIVITIES AND ACCOMPLISHMENTS DURING THIS REPORTING PERIOD, ESPECIALLY THOSE MOST NOTEWORTHY AND RELATIVE TO THE COLLEGE'S AND DEPARTMENT'S MISSION.

**One paragraph on each of the following (i.e., three paragraphs total) would be most helpful:** this past year, what have you done for our students, department/college, and self professionally? NOTE: The information in this section (along with the supporting specific information elsewhere in this report) should be your strongest case for being considered for a discretionary raise (when available), which I'll continue to award based on your contributions to the department and college this reporting period.

## Students

In regard to student interaction, I believe my first year at ESF has been productive. I taught 2 required courses for the environmental health major (Epidemiology and Disease Prevention). Although only 12 students enrolled in the Fall 2016 Epidemiology course, I had 28 enrollees in Spring 2017 Disease Prevention, and we have had to move rooms to accommodate more students in the upcoming 2017 Fall Epidemiology (currently 40 enrolled). As a first year Assistant Professor, these classes were the first I have had to develop and teach on my own. Based on semester evaluations and interactions with students outside of the classroom, students seemed to be happy with my teaching style and how I structured the classes. These courses have also attracted students from other majors including ES, EST, NRM, Biotech, EFB, SU Biology, Chem and Con Bio. In addition to teaching courses, I have jumped right into advising pre-health students in EFB. In my first year at ESF, I was approached by at least a dozen students asking whether there were research opportunities in my lab. Fortunately, I was able to get my lab up and running during my first semester, which has allowed me to take on 2 EFB undergraduates in Independent Research Courses. Both students culminated their first semester in my lab with scientific posters describing their work at the ESF Spotlight on the spring 2017 Student Research symposium. I am excited that both will be returning in the fall 2017 semester to continue their research projects. In addition to these undergraduate students, I had a MS student (MPs Cohen and Whipps) working in my lab on a portion of her thesis. I was also approached by a Professor at the University of Rochester inquiring about the possibilities of a rotation in my lab for one of their doctoral students. This student is currently working in the lab on a project involving tick-borne diseases in patients from Ecuador. This summer, I will also be assisting an MS student (MP S. Farrell) with tick and tick-borne disease work in birds around Onondaga County. As for my own graduate students, I secured 2 grants that will provide support for 2 MS students starting in Fall 2017. One student has already been identified and has accepted; the second student will be co-mentored with Dr. John Farrell but is still to be identified.

## Department/College

My service to the department and college this past year began with my teaching of 2 required courses for the Environmental Health Major. I believe both were successful in their first iteration and will most certainly improve in the coming years. I was involved with the visit of faculty from Tyumen State University and I have an open invitation to visit (likely in spring 2018). I also met and discussed ESF's Environmental Health program with individuals from the National Environmental Health Science and Protection Accreditation Panel (EHAC) who were here conducting a site visit for accreditation of ESF's EH Program. In the spring 2017 semester I served on the search committee for the Environmental Toxicology Position and got some great experience and insight into the inner workings of the College and Department. Because my lab works with a human pathogen, I am required to follow certain guidelines outlined in the Centers for Disease Control's Biosafety for Microbiological and Biomedical Laboratories (BMBL) guidelines. This has spurred the formation of an Institutional Biosafety Committee, and I am currently working with others and the Research office to get an IBC website page off the ground where researchers can go to address questions regarding their research and the role of ESF's IBC. I have also been successful in getting Level 2 registration with BEI resources a biological repository support infectious disease research this will allow me to obtain research reagents and specimens to advance my research. Through my connections at Upstate I partook in a couple meetings with faculty and Administrators from Queens University in Kingston Ontario. While these meeting were initiated by interest in Lyme disease by faculty at Queens, they have evolved into other opportunities and I have been invited to their biological station to visit and give a talk this summer. I hope to reciprocate the invite and have faculty from their school come and talk at ESF. I think there are great opportunities for collaborations between Queens and ESF. This spring I also worked closely with the research office and Upstate faculty to write and submit a funded SUNY EIP proposal that will allow for the recruitment of mid- senior level funded faculty hires at ESF and Upstate in support of the Center for Environmental Health and Medicine. Given that my research on ticks and tick-borne diseases is a very relevant topic, especially in New York State, I have been active in getting my name out as a point of contact on these issues. This has led to multiple news interviews as well as dissemination work done at ESF by the Office of Extramural and Governmental Affairs to NYS legislators in hopes for future research support.

## Self/Professional

Professionally, I have had both ups and downs over the past year. Securing a tenure track position at an institution like ESF was certainly an “up.” Transitioning from a short (and interrupted) postdoc has been a hurdle. Most notably is a gap in publications in 2016. This should be remedied as I work to wrap up one of my post-doctoral research papers this summer. This will hopefully be complemented with a paper summarizing the Ecuadorian tick-borne disease serology results that the PhD rotation student from the University of Rochester is working on in my lab. I was successful in submitting multiple (5) grants in my first years at ESF. Two grants were selected for funding while a third foundation grant garnered a letter that stated the foundation’s interest in funding my work outside of the specific proposal call. I submitted 2 projects to federal agencies (DOD and NIH), which received actionable feedback, and with support from the SUNY Center for Applied Microbiology I am conducting a pilot study to address reviewer concerns and will be resubmitting these grants in the Fall of 2017. Straying out of my comfort zone coffee with Dr. John Farrell one morning led to a great hypothesis and funded pilot study. I will be applying my knowledge and experience with next-generation sequencing and molecular biology to the field of fisheries science to answer questions regarding John’s longstanding research into the Great Lake’s Northern Pike. I have also been very busy forging an active relationship with Upstate Medical University. This is needed to support my research program. Currently, we have lab space with equipment set up in the Institute for Human Performance. I have been granted an Adjunct Faculty Appointment in the Department of Microbiology and Immunology. I have all the required paperwork submitted and am in the final stages of securing approval from Upstate’s Biological Safety Committee and Animal Care and Use Committee to begin working with infected tick transmission models. I am also in the process of getting appointed to Upstate’s Graduate Faculty Organization (GFO), which will allow me to mentor graduate students at Upstate. Working closely with Upstate had led to multiple potential collaborations that couple my expertise in ticks and their pathogens with Upstate investigators interested in the more clinical or immunological side of these diseases.

#### **IX. A. FUTURE PLANS, AMBITIONS, AND POTENTIAL CONTRIBUTIONS FOR YOUR OWN PROFESSIONAL DEVELOPMENT AND THE ENHANCEMENT OF THE PROGRAM IN ENVIRONMENTAL AND FOREST BIOLOGY (brief summary)**

I am very excited about all of the opportunities I have had this year. I think a great deal of them will lead to very fruitful outcomes that will benefit both EFB and ESF. My post-doctoral mentor has allowed me to take a very interesting zebrafish project forward. This is a project that I am very excited to start exploring with Dr. Chris Whipps and hope to have this started up in the next year. Upon arrival to ESF I had already begun trying to jump start my research program. Currently I have reached out to a colleague at Arkansas Medical College to produce a bacterial mutant using Dr. Chris Nomura’s patented molecular roadblock gene. We have great hope that this will be successful, and we can begin to identify novel mechanisms of persistence and virulence in the Lyme disease bacterium. I am also very excited to be assisting Dr. Shannon Farrell in work determining the role of birds in Lyme disease ecology in CNY. This is a topic I have always been very interested in and there is a paucity of knowledge in this area. I believe this work will supplement my proposed McIntire-Stennis study and hopefully lead to the submission of a very strong multiple investigator NSF grant on the ecology of tick and Lyme disease invasion. Between ESF and Upstate there has been a lot of talk about travel and research opportunities overseas; I hope to be able to travel in the coming year to help forge international collaborations and help explore the burden of tick-borne diseases in different parts of the world. I look forward to submitting multiple grants this upcoming year and hope this will help build my lab and personnel. These partnerships I believe will offer great opportunities to EFB undergrads. I plan to continue to improve my Epidemiology and Disease Prevention courses, which attract students from EFB. I would like to offer a cross-listed course on Topics in Vector Borne Diseases in the spring of 2018. I have had plenty of interest from undergrads on a course like this, but not much from the graduates. However, with a MS student joining my lab I hope to be able to recruit a good mix of upper level undergrads and graduates.

#### **B. PROJECTED ACTIVITIES FOR NEXT YEAR**

##### 1. Summer 2017

##### a. Course(s) to be offered

b. Proposed research activity

Research Projects

1. Complete SUNY CAM funded pilot study: Pathogen transcript capture
2. Oversee Univ. of Rochester PhD rotation student investigating tick-borne diseases in febrile Ecuadorians
3. Begin tick rearing at Upstate
4. Advise EFB MS student (MP: S Farrell) with Ticks and tick-borne diseases of birds in Onondaga county project
5. *B. burgdorferi* RPON molecular roadblock

Grant Activity

1. Submit Pre-proposal for DOD CDMRP Idea Grant program announcement (Pathogen Transcript Role:PI)
2. Submit Pre-proposal for DOD CDMRP Investigator initiated award announcement (Prospective clinical investigation of Lyme and other tick-borne diseases in Upstate NY coupled with cluster investigations. Role: CO-PI)

Manuscripts

1. Finalize data analysis and submit manuscript “Comparing the distribution of *Borrelia burgdorferi* Human Invasive Strains in *Ixodes scapularis* and their small mammal hosts across a pathogen gradient in Northern New York”. (Target Journal: PLOS one)

c. University, professional society, and public service

1. Give invited talk about ticks and Lyme disease at Marcellus Free Library, June 6<sup>th</sup> 2017
2. Give invited talk at Queens University June 7<sup>th</sup> 2017
3. Attend joint New York lab meeting on Lyme disease, August 2017 Hosted by Li Lab Wadsworth Center
4. ESF IBC

2. Fall Semester 2017

a. Course(s) to be offered

1. EFB 360 Epidemiology

b. Proposed research activity

Research Projects

1. Transition *B. burgdorferi* pleomorphic form research from *in vitro* to *in vivo*
2. Tick transmission work (*E. muris* like agent)
3. Continue advising on molecular aspects of bird/Lyme project
4. RPON Molecular Roadblock Project
5. IACUC's for Stennis and GLRC projects

Grant Activity

1. Resubmit pathogen transcript enrichment grants to DOD and NIH with added pilot data
2. Begin drafting RPON NIH proposal

Manuscripts

1. Submit manuscript on tick-borne diseases in Ecuadorian febrile patients (Target Journal: Emerging Infectious Diseases)



c. University, Professional society, and public service

1. ESF IBC
2. Give invited talk at Wadsworth Center
3. Give talk to Genesee Valley Chapter of the Adirondack Mountain Club
4. Visit Tyumen State University

3. Spring Semester 2018

a. Course(s) to be offered

1. EHS 320 Disease Prevention
2. Possible EFB 497/797: Topics in vector-borne diseases

b. Proposed research activity

Research Projects

1. *B. burgdorferi* pleomorphic form research
2. Tick transmission work (*E. muris* like agent)
3. Study design for Stennis and GLRC projects (beginning summer 2018)
4. Continue advising on molecular aspects of bird/Lyme project
5. RPON Molecular Roadblock Project
6. Lyme disease in Zebrafish

Grant Activity

1. Continue working on RPON NIH proposal

c. University, professional society, and public service

1. Attend 2018 Gordon Research Conference, Biology of Spirochetes
2. ESF IBC