

## **Streams of Consciousness**

LARC Grant Rationale and plan of work for the research community: (word count: 536)

*Stephanie Lenox and Liz Perkin*

The emerging field of the ecological effects of artificial light is a topic rich in symbolism and emotional response. Our project will investigate the science of storytelling while discovering the story behind science by engaging in creative writing exercises that respond to this potentially ground-breaking ecological research. Professors Stephanie Lenox (English) and Liz Perkin (biology) will be joined by students Tyler Griswold (English), JoAnna Hernandez (biology), Anya Romig (biochemistry), and Alexandra Wert (chemistry) in a tightly-coordinated group to produce narratives based on scientific work in the field and in the lab. The cohort's creative efforts will be guided by techniques and principles being refined for a textbook on short-form writing. This textbook will be the first of its kind in its close examination of multi-genre creative writing techniques and what happens to narrative under the pressure of extreme brevity. Placing language under a metaphorical microscope, students will experiment with short-form methods of storytelling to document the ideas, themes, and observations that emerge from their field work.

Artificial light at night has major implications for conservation and can be representative of the way humans interact with nature. In this sense, studying artificial light from a scientific perspective will harken back to some of the great American conservation writers, including Aldo Leopold, Barry Lopez, and Henry David Thoreau. We will read works by these authors and others, while asking, "how do these authors turn their observations of the natural world into a creative document? Can we discern an underlying method used by each author to shape their narrations?" Similarly, we will also be reading scientific literature from different time periods to examine how narration has changed over time within the scientific community. Like the conservation writers we admire, we will take much of our inspiration from our time in the field—in light and dark, day and night, along streams and in the forest—to produce our writing. In order to immerse ourselves in this process, we are planning on taking a creative retreat to a natural area, likely H. J. Andrews Research Forest, which is owned by Oregon State University and hosts a writer-in-residence program. Of course, we expect that the joys and frustrations of lab work will also serve the basis for our writings and will help us connect our human artifice to nature in a different way.

Every member of the team will engage with both the scientific and creative writing aspect of this proposal, guided on either side by Professors Lenox and Perkin. Anya and Tyler have developed specific plans for independent research with Liz Perkin, but JoAnna and Alexandra will also get an opportunity to collect data and establish their own project as well. We envision this as being a true collaborative effort. Accordingly, all of the students (as well as Liz Perkin) will be producing short writings based on prompts provided by Stephanie Lenox. These prompts will form the basis of the creative products the students will generate at the end of the project, and include a blog, a podcast, a journalism piece, and a public storytelling event. Even though each student will take the lead on one of these creative products, we will all contribute to each of them as well.

Stephanie Lenox  
LARC Streams of Consciousness (word count: 500)

**Project's state of evolution:** While developing a special topics course on prose poetry and flash fiction in fall 2014, I discovered a lack of textbooks that addressed the unique concerns of writing creatively in short forms, including prose poetry, flash fiction, or micro memoir. In the literary world, the interest in extremely short (fewer than 500 words) and hybrid writing has been exploding, yet I could not find a single textbook that approached this particular mode of writing in a multi-genre format. Most books I found focused on distinctions between the genres rather on the fundamental commonality, which is that these forms intensify language and require extreme precision and control. Through my research, teaching, and presentations at conferences, I have also recognized that short-form writing is an effective pedagogical tool for experimenting with language and honing creative techniques that can be applied to other kinds of writing. My textbook proposal for a multi-genre approach to short-form creative writing is currently under consideration at Bloomsbury Publishing. My goal is to write a sample chapter for this book over the summer that can stand-alone, with some changes, as an article in a peer-reviewed journal. The LARC summer project would further this goal by allowing me to have students “test drive” writing techniques and prompts as they engage with scientific data-collection and individual projects.

**Methods for engaging collaborative work:** I have always been interested in the intersections between science and storytelling, but I became even more intrigued with this idea when research for my textbook uncovered an article by Frederick Luis Aldama entitled “A Scientific Approach to the Teaching of Flash Fiction” published in *Interdisciplinary Literary Studies*. In this article, Aldama quotes Mario Bunge who says that science is “the critical search for or utilization of patterns in ideas, nature, and society.” Building off this idea, my colleague Liz Perkin in the biology department and I will explore the science of storytelling (the systematic study of narrative patterns through close reading and creative writing) and the storytelling of science (compelling ways that science can be shared in story form to appeal to a wider audience). While collecting insects from urban streams to study the effects of artificial light, students will keep “stream of consciousness” field journals. These field notes will provide the foundation for original creative work that tells the story of their scientific experiences. I will also oversee individual student projects, such blog entries, story pitches, and abstracts written for a lay audience, which will make use of short-form techniques to generate writing on scientific subjects that is compelling and compact, precise and poetic. Science and creative writing both require focused curiosity, and I am excited about the potential of participating in field work that has such rich metaphorical possibilities for my own writing.

**Outside funding:** While I do not have outside funding for this project, I do have a strong network of literary and publishing contacts, both editors and writers, who can provide additional resources and guidance for students' written work.

Liz Perkin

LARC Streams of Consciousness (word count: 428)

**Project's state of evolution:** For the past six years, I have conducted research on stream insects' tendencies to spend less time moving through the water column ("drifting") when exposed to artificial lights. This research was the foundation of two peer-reviewed scientific articles, and I intend to build off this ground-breaking research with the assistance of students involved in the Streams of Consciousness LARC project. The next phase of research will involve students in a pilot study to establish a potential evolutionary adaptation by insects to artificial light. The data from this summer's research will help me develop a research proposal for a larger, longer term study. One possible outcome is a collaboration with a fisheries and aquatic sciences professor at the University of Washington who is eager to include students from Willamette who have experience and training in this topic in his research as well.

Because my research is so relevant to policy makers it is critical that my students and I are able to share a clear and compelling story around our studies. The Water Resources Inventory Committee 8 of King County, WA, and the fisheries division of the National Ocean and Atmospheric Administration are both interested in this research and communicating our results to policy makers who are concerned with the effects of light pollution (or something else specific here).

**Methods for engaging collaborative work:** My research will focus specifically on the potential evolutionary consequences of light exposure on stream insects, but Tyler and Anya will be studying how the quality (spectra) and quantity (intensity) of light might influence the reaction of stream insects to light. This is an important component of the research, as city planners and conservation managers are trying to determine if changing the spectra or intensity of lights used in cities will reduce ecological impacts.

Stephanie Lenox will help guide our foray into the creative world. I have been involved in science storytelling and communication events before, but I have never had the opportunity to collaborate with someone trained in creative writing. My hope is that through this LARC program, both the students and I are able to communicate our science to people who can use it to improve policy, as this is an increasingly sought-after skill in the scientific community.

**Outside funding:** I have no internal funding for the project, but I do have support from a light manufacturer in Seattle who is prepared to provide the lights necessary for our lab study. I will also be writing grant proposals to purchase a light meter to be used in the study.

Tyler Griswold

Primary Mentor: Liz Perkin

LARC Streams of Consciousness (word count: 500)

As cities become more industrialized, artificial lights have become quite common, increasing feelings of safety and modernity for humans at the expense of the organisms residing within streams near lights. Aquatic insects are one group of affected organisms. Aquatic insects tend to drift through the water more in the dark, when their movements are not as easily detected by predators. When artificial light is introduced these insects may stop drift behavior. The consequence of this slight change in behavior has consequences beyond the insects, as it can affect other stream organisms, such as fish and algae. However, we might be able to mitigate the effects of lights on streams by researching which lights disturb aquatic insects less. Blue lights may influence the organisms' behavior differently than orange ones, as the differing wavelengths may penetrate the water to varying degrees. With the help of Liz Perkin and Stephanie Lenox, I will conduct research on two groups of insects: those from an urban area exposed to artificial light, and those collected from a pristine, dark stream. I will then record the drift behavior of both groups in separate light and dark environments, switching out different light types to examine their effects. After collecting data from our trials, we will analyze our findings to answer the questions: does light significantly change the drift behavior of insects? Do some lights cause a more pronounced change than others? Eventually, the results will be presented in a scientific research paper. As storytelling is also a main facet of this project, I will explore methods of creative dissemination by creating a series of three 10-minute podcasts, which will detail my own as well as other group members' experiences through this process.

Previously, I was awarded the College Colloquium Student Research Grant for my project *Changing Ableist Views Within Medicine: Educating with Music*. My grant was multifaceted, and combined literature, music, creative expression, and education to influence social change in the realm of disability politics. The project culminated with a 17-track, electronic pop album *Asylum Fury*, created solely by myself, presenting theories from disability studies through a spectacle that would garner a much larger influence than a scholarly paper. Although my focus at Willamette has mainly been in English, I have been involved in removing invasive species and restoring riparian areas during my years at North Salem High School. Though I appreciate all that I learned through these experiences, I am interested in doing a much more research-intensive project where I can gain experience carrying out a scientific study.

Upon graduation I hope to be accepted into a psychiatric mental health nurse practitioner program where I can combine my own personal investment in disability politics, biology, psychology, knowledge of social constructs, and literature and creative writing as coping mechanisms all into one career. Being a part of the *Streams of Consciousness* group would allow me to focus my skills into a project that combines both literature and science, letting me take the first steps to my cross-disciplinary career.

JoAnna Hernandez

Primary Mentor: Stephanie Lenox

LARC Streams of Consciousness (word count: 500)

I am very interested in the “Streams of Consciousness” LARC program led by Professors Perkin and Lenox because it combines two subjects I am passionate about: writing and biology. Studying biology at Willamette has developed my confidence in approaching scientific research. However, I understand how the subject can be intimidating, and I would like to make scientific information more broadly accessible to a lay audience. I believe that our current way of sharing research is limited by the specialized audience that can understand and participate in it. By increasing the number and diversity of people engaging in science research, we can expand the study of science and its application.

Making scientific research more approachable is my main drive for this project. I have read Perkin’s research about artificial light’s influence on stream ecosystems and would like to explore how this research can be presented to audiences outside the science community. For my project, I plan to express the impact of this project through a story pitch or query to science-based publications, such as *Popular Science* or *Scientific American*, and to local publications, such as *Salem Weekly* and the *Statesman Journal*. Guided by Lenox’s publishing contacts and experience, this collaboration will challenge me to take a different perspective on research and pursue my interest in science writing.

Reviewing the history of science writing will help me understand how scientific information has been previously presented and how these forms of communication have evolved. I plan to research alternative ways science is currently being shared, such as popular magazines and organizations like the TEDx Program. I will test various styles of scientific writing by sharing interesting discoveries on a blog being developed by fellow collaborator Alex Wert. In this space I will draw on my collaborators’ experiences and practice translating scientific data into intriguing and comprehensible pieces to be shared through both written and visual posts. “What information is important?” and “How can I express this in a relatable way?” are two research questions that will guide me.

This past semester I have been writing an analysis on the work of Jeanette Winterson, an author who challenges the reader’s typical way of thinking and traditional narrative forms in order to develop new modes of communication. I believe that my research in this area, as well as my experience in other courses, would provide an interesting perspective. My previous experience in working with insects, such as *Americana periplaneta*, would be applicable to the type of research we will be conducting.

I am currently hoping to pursue a career in science writing. This collaboration would allow me to experiment with this type of work and explore a variety of science writing styles. I would also gain valuable research experience and have the opportunity to do field work, which I fell in love with last summer when I traveled around Oregon collecting newts for research. Ultimately, I believe this program will challenge me, use my strengths, and help me become a more aware and creative scientist.

Anya Romig

Primary Mentor: Liz Perkin

LARC Streams of Consciousness (word count: 474)

My greatest passion has always been the environment. From a young age I enjoyed exploring hidden trails, peering under mossy rocks and forging up rivers through gentle rapids. I relished the outdoors and had a profound wonder for the natural world. As I grew older, however, I became aware of human impacts on the planet and developed a passionate intrigue for science and its ability to explain the natural world. My love of science led me to major in Biochemistry with the hopes of using my knowledge to understand complex environmental phenomena at a chemical level. Although chemistry is my field of study, the environment remains my research interest.

One concept that intrigues me is how seemingly positive changes for humans may be detrimental to ecosystems. In our culture, light often symbolizes all things good. However, there is a dark side to light that can be seen in studies of the adverse effects of light on ecosystems. Urban lights attract newly hatched sea turtles toward shore rather than the ocean, and light pollution has been correlated with significant disruptions in birds' migration patterns. Not even humans are safe—multiple studies have shown a correlation between light pollution and cancer risk due to the disruption of circadian rhythms. It is clear that urban ecosystems, despite the obvious value of light, are significantly affected by unnatural light exposure.

Studying the effects of light on an ecosystem by comparing dark pristine streams and urban streams is an exciting approach because there is room for exploration. Analyzing insect drift is one of many possible approaches. Previous research examining connections between insect drift and light pollution have shown that insect drift is affected by lighting in urban streams because insects are more likely to drift at night to avoid predators. This reduction in drift can disrupt the in-stream food web by affecting organisms who rely on insects as a food source. It is therefore likely that light has a significant effect on stream ecosystems.

With this in mind, I will be studying how different light intensities affect insect drift with Liz Perkin as my primary mentor. It is important to understand exactly how urban streams exposed to urban lighting are affected so that steps can be taken to reduce the consequences of light pollution. Questions I will consider throughout my research will include: how do varying light intensities affect insect drift? Is there a strong negative or positive correlation associated with light intensity and insect drift? If there is a correlation, is there a point where insect drift is no longer significantly affected by light intensity? Can any comparisons be drawn between ideal artificial light intensities and lunar light levels? The major output of this project will be a blog dedicated to documenting this research experience and describing how my views on light at night change through the project.

Alex Wert

Primary Mentor: Stephanie Lenox

LARC Streams of Consciousness (word count: 469)

As a major in Chemistry, I've spent considerable time in the lab cultivating a passion for research. Most of the courses in my major require lab work, which has allowed me to develop research skills such as careful annotation of experimental records, precise measurements, accurate use of scientific instruments, and clear and concise scientific writing. In my free time I like to explore science-related literature, such as Carl Sagan's *Cosmos* and Bill Nye's *Undeniable*. I've also begun to enjoy writing as a creative outlet, which has spurred me to take a creative writing course this semester. I believe my research skills and my passion for science writing makes me uniquely suited for this interdisciplinary project.

In conjunction with Professor Liz Perkin's project investigating whether insects have adapted to light exposure, I would like to explore the effect that artificial light has had on the activity patterns of animals. Researchers have suggested that artificial light is linked to the prevalence of road kill, including the deer-in-the-headlights phenomena; disruption of foraging activity in nocturnal mammals; and disruption of animals' biological clocks. Artificial light has also been linked to cancer and obesity in humans. I'm interested in the effect of nitrate on animals' activity patterns. Nitrate is a smog-clearing compound that is broken down by natural and artificial light. Thus the presence of large amounts of artificial light worsens smog conditions in cities, which in turn may affect the activities of animals, especially birds, in urban areas.

Some questions I would like to consider are as follows: How has artificial lighting affected the time of night that nocturnal animals typically emerge? How have the circadian rhythms of plants, animals, and humans been affected by the introduction of artificial light? How has the prevalence of artificial light affected the concentration of nitrate in the environment? I would like to report my findings as well as the findings of my collaborators in a more creative format than is typically used when discussing scientific research. Professor Stephanie Lenox will be a valuable resource to guide my creative endeavors. The output of this project will likely take the form of a blog that can be understood and enjoyed regardless of one's background in formal scientific research. My personal project will help to identify how artificial light has affected the ecology in and around Salem and share these findings in a compelling and creative way to a larger audience.

In addition to gaining a greater understanding of our local environment I would hope to improve my skills as a scientific researcher and as a creative and scientific writer. I would also like to gain an appreciation for how scientific writing has evolved. This project will develop my skills as a researcher in an interdisciplinary environment outside of regular coursework in order to clarify my long-term career goals.

## LARC Streams of Consciousness

**Budget items:**

Transportation 100/day, 3 days HJ Andrews, gas	\$700
HJ Andrews \$25/person/night 6 people x 2 nights	\$300
Lab equipment 6" x 3 m (9.8') pipe x 3	\$200
Field journals/rite in the rain: \$6.95/ea + S&H	\$48.50
Total	\$1248.50