

**IMPROVING TEACHER QUALITY GRANTS PROGRAM
COVER SHEET #1**

Please choose the subject area(s) that best describes your proposal by marking the appropriate blank.

Language Arts

Mathematics

Reading

Science

Social Studies

Proposal Title: Discover Life: Applying Ecological Knowledge to Georgia's Performance Standards

Funds Requested from Teacher Quality:

\$74,080.69

Amount of Funds committed by LEA or other agency:

Partners

1. LEA (list high need LEAs first):
Atlanta Public Schools, Spalding County Schools
2. Unit of IHE that prepares teachers:
University of Georgia College of Education
3. Arts & Sciences content unit of IHE:
Odum School of Ecology
4. Others: Oconee River Georgia Youth Science and Technology Center at NE Georgia State University
Drennon and Associates

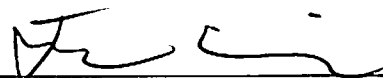
Please attach typed proposal abstract of 250 words or less. [Instructions for writing the abstract are included in the RFP.]

Provide the name, mailing address, email address, telephone number and fax number for the Project Director and all Co-Directors. This information should be also on the abstract page.

Requested Contract Begin Date: February 1, 2012

Requested Contract End Date: May 15, 2013

Department Head Signature



Date

10/18/11

Improving Teacher Quality State Grant
Title II, Part A of Public Law 107-110, the "No Child Left Behind Act"
Discover Life: Applying Ecological Knowledge to Georgia's Performance Standards

A partnership between selected Georgia Science Teachers and the University of Georgia (UGA), The Atlantic Public School System, Oconee River Georgia Youth Science and Technology Center (GYSTC) located at Northeast Georgia Regional Educational Service Agency (RESA), and Drennon and Associates (a minority-owned educational testing evaluation service)

"Teachers are the most important factor in student achievement."
Sparks & Hirsch, 1999, *A National Plan for improving professional development*.
Oxford, OH. National Staff Development Council.

CONTACT INFORMATION

PROJECT DIRECTOR:

Dr. John Pickering

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http://www.discoverlife.org/who/Pickering,_John.html

PROJECT CO-DIRECTOR:

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COVER SHEET #2
SUBRECIPIENT PROPOSAL COVER SHEET

Sub-Award Proposal Submitted to: Improving Teacher Quality State Grants—Title II, Part A

Sub-Award Organization: University of Georgia Odum School of Ecology

Address: Room 103, Ecology Building, Athens, GA 30602

Phone: (706) 542-1115

Fax: (706) 542-4819

Sub-Award Project Director:

Teacher Quality Director: Dr. Kathy Thompson
Title: Improving Teacher Quality State Grants—Title II, Part A

Requested Amount: \$74,080.69

It is agreed that the submission of this bid proposal binds the sub-awardee if awardee is funded the full amount of its proposal and if the awarded project period is the same as the proposed period of performance.

It is further agreed if prime award to awardee is less than originally proposed by awardee or date of performance of same is changed, then sub-awardee will, if requested submit in writing an amended proposal to perform the services for an agreed amount.

By signing this cover sheet the Project Director (PD) is agreeing to be fiscally responsible for any and all funds which could possibly be awarded to him/her. The PD understands and accepts all potential reporting requirements associated with Teacher Quality grants and will complete them fully, accurately and promptly. Additionally, both the PD and the Department Head understand that any unallowable costs or overages charged to the Teacher Quality grant will not be covered by Teacher Quality and instead will be drafted from the account number below. This paragraph is in no way a guarantee or notice of funding and shall only serve to provide assurances that certain standards shall be upheld and responsibilities undertaken upon award notification.

Department Head: John Gittleman
Please Type

Department Head Signature: Sam Fow

Account Number (what account will any overspending/incorrect be taken from): 102562531000

Project Director: John Pickering
Please Type

Date: 10/14/2011

PD Signature: [Signature]

ABSTRACT

Georgia is one of the most biologically diverse areas in the country. It offers many opportunities to learn science through studying species and their interactions. The goals of this **renewal, targeted to science teachers in high needs LEAs**, are to

- strengthen in-service science teacher subject-matter knowledge by way of professional learning experiences with Georgia's biota;
- focus attention on implementing Georgia's Performance Standards both by providing teachers with standards-based activities and the expertise to create their own such activities;
- enhance science teachers' skills with web-based technologies, global positioning systems, digital cameras and quantitative methods;
- directly apply new, research-based knowledge in classroom curricula by involving students in an innovative, state-wide learning project, the Georgia Natural History Survey;
- develop concepts in applied science and environmental awareness by linking education with natural resource research, policy and planning;
- connect ecological research, natural history, biology, resource management, conservation, pollution biology, civic engagement and citizenship, computer-based information technologies, geography, mapping, and regional and state planning;
- use digital photography to collect data about species and use these data to develop geospatial, mapping, and analytical skills;
- observe the timing and occurrence of our flora and fauna to learn about the impacts of weather, invasive species and pollution;
- provide continuing professional education opportunities for Georgia science teachers (including earning 5 PLUs).

Partners: Atlanta Public Schools, Spaulding County Schools, UGA (Ecology, Education, Arts and Sciences), Oconee River GYSTC, Drennon and Associates.

Start date: February 1, 2012

End date: May 15, 2013

PROPOSAL TEXT

DEMONSTRATED NEED:

According to reports by the Atlanta-based Southern Education Foundation, <http://www.sefatl.org>, which analyzes educational issues in the American South, in 2010 our region saw more of its people fall into poverty than all the rest of the nation combined and has more children in extreme poverty. To improve science education in Georgia, our proposed project uses the scientific study of natural history to help teachers meet the Georgia Performance Standards (GaPS):

<https://www.georgiastandards.org/Standards/Pages/BrowseStandards/ScienceStandards.aspx>.

We need students to be more curious and understand the characteristics of science. By improving teachers' content knowledge of natural history and enabling them to incorporate scientific research, environmental citizenship, and challenging content-areas into standards-driven curricula, their students will make measurable improvements in their performance on science metrics.

The *Georgia Natural History Survey* (<http://www.discoverlife.org/gnhs>) is a new initiative to teach science and quantitative skills through inquiry-based learning; understand the impacts of weather, invasives, pollution, pests, diseases and other factors on species and their interactions, and provide timely information to gardeners, farmers and natural resource managers, enabling them to respond rapidly to invasives, pests and other threats. Here we propose to involve schools in high-needs local education agencies (LEAs) so that they benefit from this endeavor.

GOALS AND OBJECTIVES:

Georgia is one of the most biologically diverse areas in the country. For example, it boasts over 3,800 plant, 730 lichen and 2,460 moth species, all of which can be readily and safely studied by students using digital cameras. Because this rich biodiversity is poorly studied, our state is an outdoor laboratory, full of unknowns awaiting discovery. It provides many opportunities for students to make original contributions to our scientific knowledge.

Over the past 15 years *Discover Life* (<http://www.discoverlife.org>) has developed and tested on-line tools and research methods for students to study natural history and ecological

questions. These methods are easy to use in the classroom, enabling teachers and students to collect high-quality data on species and their interactions within habitats.

In addition to the specific goals and objectives that are given in our proposal's *'Abstract'* and the *'Characteristics of Science standards'* and *'Content standards'* below, our larger goal here is to network schools and scientists across the state and excite students by doing hands-on science.

For example, knowledge of environmentally sensitive species, such as lichens, can help us better understand the impact of changes in the environment. Over the past five years our participating teachers and their students have helped monitor lichens, plants and insects. Such distributional data can be correlated with air quality data from the Georgia Department of Natural Resources, <http://www.air.dnr.state.ga.us/amp>, and weather data from NOAA, to learn about environmental quality. Thus, as citizen-scientists, teachers and students will be more prepared to address environmental policies and engage in the democratic process.

PLAN OF OPERATION:

Teacher Impact: Our changing society demands highly adaptive teachers, armed with the latest knowledge and technology. As such, activities in this project enrich the following: Educator-Enhancement/Teacher Quality in Science and Environmental Education; Teacher In-Service Training; Citizenship and Civic Engagement; Integrated /Interdisciplinary Studies; Information and Communications Technologies. Our activities include:

1. **Training Teachers** -- by providing a summer learning opportunity with sustained yearly contact for 20 educators (grades 3-12) to attend workshops/fieldtrips on ecology, biology, taxonomy, and effects of climate, pollution and other large scale factors on species.
2. **Participation in the Georgia Natural History Survey** -- teachers and students will inventory and monitor plants, insects, lichens and other groups across Georgia.

Teaching to the Georgia Performance Standards (GaPS): This proposal emphasizes specific in-class activities based on scientific principles and educational best practices to address the GaPS. These activities will help teachers use their increased knowledge of natural history to produce measurable improvements in student outcomes. Teaching students to use curiosity, ask good questions, form hypotheses, design experiments, collect data accurately, use tools for measurement, and interpret and analyze data are Characteristics of Science standards that apply

across every grade level. These abstract concepts are best taught through research experience, which is why participatory science projects like *Discover Life* have the power to teach these important "SCSh" and "S3-8CS" standards so effectively. These standards are listed at the beginning of each section below, and are followed by the Content standards for the appropriate grade level. We will help teachers meet the following standards:

- **Grade 3. Life Science:** Characteristics of Science standards: S3CS1a, curiosity and openness, keeping records of observations; S3CS3, using tools (cameras are specifically mentioned); S3CS&, how scientific knowledge is achieved; S3CS8, features of the process of scientific inquiry, collecting data, using technology. Content standards: S3L1, the habitats of different organisms and dependence of organisms on their habitat; S3L2, the effects of pollution (especially on lichens) and humans (land use, climate change, invasive species) on the environment.
- **Grade 4. Life Science:** Characteristics of Science standards: S4CS1a, curiosity, keeping records of observations; S4CS3, using tools and instruments, especially computers and cameras; S4CS7, the character of scientific knowledge, old knowledge still applicable today, (comparing their own data to old records of species occurrences); S4CS8, making observations, collecting species data. Content standards: S4L1, roles of organisms (pollinators on flowers, lichens on trees, etc.); S4L2, factors that allow organisms to survive (such as drought tolerant plants, camouflaged moths).
- **Grade 5. Life Science:** Characteristics of Science standards: S5CS1a, curiosity, keeping records of observations; S5CS3c, using tools, especially cameras; S5CS7b, comparing older natural history to current data, S5CS8a and c, taking observations, using technology. Content standards: S5L1, Classification of organisms into groups; S5L4, How micro-organisms can benefit or harm larger organisms - for example, lichens benefit from algae and fungal symbiosis whereas diseases carried by insect vectors can harm plants.
- **Grade 7. Life Science:** Characteristics of Science standards: S7CS1a, keeping accurate records; S7CS3, analyzing data from '*Mothing*' (see <http://www.discoverlife.org/moth>); S7CS4, using tools and technology - cameras and web tools; S7CS8a, necessity of large scale data collection for meaningful results; S7CS9e and f, accurate record keeping, data sharing, use of technology and mathematics. Content standards: S7L1, using

dichotomous keys, *Discover Life* tools for classification; S7L4, dependence of organisms on one another, environmental conditions affect survival, characteristics of temperate biomes;

- **High School. Biology:** Characteristics of Science standards: SCSH1, experimental design; SCSH3, collect, organize and record data, analyze data, and develop conclusions (especially our '*Mothing*' component); SCSH4, use technology (cameras, rulers, GPS units, microscopes, UV lights, web tools); SCSH7, understanding how scientific knowledge is developed; Content standards: SB3, exploring structure and function of organisms and classification; SB4, relationships between organisms, adaptation to ecosystems, how species might be affected by human activities, relate plant and animal adaptations to stressful conditions.
- **High School. Environmental Science:** Characteristics of Science standards: SCSH1, exhibit curiosity, understand the importance of experimental design; SCSH3 collect, organize and record data, graphically compare data, develop conclusions (e. g., '*Mothing*'); SCSH4, use tools and technology; SCSH5, use computation and estimation to analyze data (e. g., '*Mothing*'); SCSH7, comparing current data with older data; SCSH8, critically examining data analysis. Content standards: SEV1, flow of energy and cycling of matter -- fungi as decomposers, plants as producers, insects as consumers; SEV2a and b, abiotic components such as climate affecting biosphere, becoming familiar with organisms, populations and communities; SEV3, how species can be affected by weather, pollution, invasives, and interactions between individuals -- lichens and pollination as mutualisms, parasites, prey and competition among insects; SEV5, impact of human activities such as land use, pollution, invasive species and climate change on the ecosystem.
- **High School. Botany, Entomology, & Ecology:** Additional standards are highly relevant but not listed here.
- **Grades 3-12. Mathematics:** With the addition of *Mothing's* new 'Results' and 'Analysis' sections, we can now help teachers meet math standards. We propose to work with local middle school and high school teachers to develop activities to meet the Mathematics Process Standards across grades 3-12, as well as standards associated with specific

courses, such as MAMDMN1 for Advanced Mathematical Decision Making for 12th grade, and M5D1 and M5D2 for Data Analysis and Probability for 5th grade.

An integrated/interdisciplinary approach: This project incorporates science, writing skills, and civic involvement on the part of schools, teachers, and students. Curriculum/Content areas included in this project: Ecology/Natural History/Ecosystem Management; Environmental Biology; Environmental Health; Computer Data-base construction; Website construction and maintenance; Geographical mapping; Global Positioning Systems; Meteorology; and Citizenship/Democracy.

Partnerships: We incorporate (a) UGA's Odum School of Ecology, (b) UGA's College of Education, a teacher preparation unit; (c) UGA's Center for Remote Sensing/Mapping; (d) Atlanta Public Schools, (e) Griffin-Spalding County Schools, both high-needs LEAs; (f) a Non-Profit Organization, GYSTC at RESA; (g) a minority-owned educational evaluation business, Drennon & Associates.

Building on a History of Success: This project is built on previous years' projects, but is substantially modified so as to provide a scientifically based professional development program for Georgia teachers centered on the GaPS. The past programs have been rigorously evaluated after each workshop, with recommendations incorporated in each succeeding year. For example, see 2011 evaluation: <http://www.discoverlife.org/pa/or/polistes/pr/2012tq/eval.pdf>. This has enabled us to continue to meet the changing demands of the educational reform environment by incorporating both evaluator feedback and insights from other programs. The core activities of each day are based on content-appropriate materials, linked to the Georgia Performance Standards, in actual classroom and field settings. This proposal is therefore designed as an ongoing model program that documents the accomplishments that a scientifically designed and adequately funded program can bring to teacher professional development.

Additional Benefits: In addition to training teachers and engaging students as both learners and researchers, this project has, over the past years, enjoyed a number of important successes and achievements *beyond the scope of the funded grant* that warrant mentioning:

- **Teachers Becoming Researchers:** Teachers who have attended past workshops have frequently reported that, in addition to becoming better teachers, they have now come to see themselves as researchers *making* science rather than simply as consumers of science who teach it passively.

- **Participation in the Georgia Natural History Survey:**

In previous years this project contributed to the Statewide Lichen Database that has distribution maps with over 7000 lichen observations (see <http://www.georgialichens.org>). The project has resulted in new data regarding the distribution of lichens. Seven species never before found in North America were located in Georgia by participants, and two species never recorded in the eastern US were also found. The project participant-derived database thus provides baseline information for measuring future environmental and ecological changes. Since the participation of *Discover Life* this year, participants have also added data on plants, insects and vertebrates to the Georgia Natural History Survey.

Proposed activities:

- **Pre-workshop activities (participants)**

Program Planning, Development & Management, (Dr. Pickering, Dr. Hill, Ms. Lowe); Marketing/Recruitment of participants, PLU awards (RESA/GYSTC: Mr. Nickelsen, *Discover Life*: Ms. Lowe); Geospatial work preparations (GPS), Center for Remote Sensing & Mapping Services (Dr. Jordan); Lichen and plant taxonomy and ecology preparations (Mr. Beeching and Mr. Bowling), and Evaluation design (Dr. Drennon Bryant and associates).

- **Summer 2012 workshop -- learning activities for 20 teachers (grades 3-12)**

- **Day 1**

10:00am - Arrival at the Charlie Elliott Wildlife Center - Housing arrangements finalized.

10:30-11:30am - Introductions. Pretest. Distribution of workshop materials.

11:30am-12:30pm - Overview of the GaPS for Science as they relate to this project.

1:30-2:30pm - Live web demo of *Discover Life* tools for studying natural history.

2:30-3:30pm - Distribute cameras. How to photograph lichens, plant and insects.

3:45-4:00pm - Video and Instruction: Protocols for documenting time and place using GPS and cell phone. Protocols for photographing lichens, plants and insects.

4:00-5:30pm - Photo foray-1: Small groups to granite outcrop, lake path and forest.

6:30-8:00pm - Using *IDnature guides* on *Discover Life* to help students identify Georgia's lichens, plants and insects.

9:00pm-midnight - Optional activity: Collecting moth photographic data.

Objectives: After day 1, participants will be able to understand that collecting high quality data on species can help us study effects of climate, pollution and invasive species; use digital cameras to collect data on lichens, plants and insects; use GPS and cell phones to accurately record time and place; use *IDnature guides* to identify species, and effectively apply concepts in the GaPS to *Discover Life* activities.

○ **Day2**

8:30-9:30am Introduction to Geographic Information System and use of Global Positional Satellite (GPS) units

10:00am - 12:30pm Photo foray-2: Collecting photographs as data (each small group will rotate to different habitat with different group leader)

1:30-2:30pm Uploading and editing photographic data with *Discover Life* albums

2:30-3:30pm Using *IDnature guides* to identify and label species photographs

3:45-4:15pm Hands-on workshop: Introduction to common plants of Georgia, how they indicate habitat, and what changes we might see from changes in weather patterns, invasive pests, and other large-scale effects.

4:15-5:00pm Photo foray-3: Small groups to collect plant photographs.

5:00-5:30pm 'Mothing' activities for teaching data analysis, graphing, pie charts.

5:30-6:30pm - Working dinner -- Meet in grade-level cohorts (elementary, middle school, high school biology, high school environmental science) to discuss application of 'Mothing' to GaPS for science and math.

9:00-11:00pm *Optional Evening Activity-1*: UV demonstration of lichen fluorescence.

9:00pm-midnight *Optional Evening Activity-2*: Collecting moth photographic data.

Throughout the day instructors will introduce concepts related to the GaPS: accurate collection of data; analysis of data using pie charts, graphs, and other means; diversity of life, symbiosis, dependence of organisms on habitats; species

adapted to different GA regions; using geospatial points to map (from GPS data) & to show species locations; how species indicate different ecosystems.

Objectives: After day 2 participants will be able to: Effectively use GaPS based '*Nothing*' activities for 7th grade life science, 9th grade biology, and high school AP biology and high school environmental science; describe and discuss common plants of Georgia, how they indicate habitat, and how they might be affected by weather, pollution, and invasive pests; determine latitude/longitude with a Global Positioning System receiver; upload and edit photographs on *Discover Life*, and better use *IDnature guides* to identify species.

o **Day 3**

8:30-9:30am - Hands-on workshop: How to identify 12 common lichens of Georgia, where to find them. Some GA lichens species that serve as indicators of air quality.

9:30am-12:30pm - Photo foray-4 -- Small groups collect lichen photographic data.

1:30-2:00pm - Using album '*life lists*' to motivate students through competition.

2:00-3:30pm - More practice uploading and editing photographic data, and using *IDnature guides* to identify species.

3:45-4:30pm - Applying GaPS in science to activities with plants, caterpillars, ladybugs, pollinators, and lichens.

4:30-5:30pm - Meet in grade-level cohorts with an instructor assigned to each group to update lichen activity sheets and create new lesson plans based on plants and insects.

5:30-6:30pm - Working Dinner -- continue meeting in grade-level cohorts to apply GaPS to natural history, refine lesson plans and activities.

6:30-7:30 - *Optional Evening Activity-1*: Demonstration and hands-on experience with tardigrades (lichen microinvertebrates).

9:00pm-midnight - *Optional Evening Activity-2*: Collecting moth photographic data.

Objectives: After day-3 participants will be able to apply GaPS to novel study activities using wildflowers, trees, caterpillars, ladybugs and lichens; use *Discover*

Life to keep records of scientific observations and investigations, including motivating student productivity through species '*life lists*'; use lichens, plants or insects as examples to classify organisms; use *Discover Life's* techniques to illustrate how to collect data for experiments and analysis; describe role of organisms in the environment, including energy exchange between organisms; study a small community of organisms located near school; use GPS/geospatial data technology to increase their power of observation.

○ **Day 4**

8:30-10:30am - Photo foray-5 -- Small groups collect photographic data, focusing on '*Bee Hunt*' to find pollinators and other insects on plants.

10:30-11:30am - Meet in cohorts of grade level to create standards-based activity sheets and lesson plans using plant-insect interactions such as bees and other pollinators, caterpillars and other plant eaters .

11:30am-12:30pm - Each small group will share their lesson plans and activities with the larger group.

1:30-2:00pm - *Georgia Natural History Survey*

2:00-3:00pm - Presentation on future field trips; Sustained Contact Weekends (mandatory for PLUs: a weekend in October and a Saturday in March, 2013 at UGA).

3:15-4:30pm - - Class forming a focus group to discuss and evaluate how they can use knowledge gained from their first program in the classroom; how to troubleshoot the classroom exercises based upon their professional experiences; and how to assist program planners in creating new exercises for future cohorts.

4:00-5:30pm - Wrap-up with post-test evaluation and focus group on experience.

Objectives: After day-4 participants will also be able to effectively use GaPS based activities for selected grades in classroom settings; use lichens, plants and moths to illustrate the diversity of living organisms; use identification keys; discuss ecosystems; record findings clearly and accurately; link GPS and photographic data; use natural history to train in the use of scientific tools and technology (cameras, web tools, GPS units, microscopes, UV lights); show links between distribution, pollution and weather data; investigate the diversity of

living organisms; examine dependence of organisms on one another and the environment; illustrate food webs and relationships; use lichens and shortwave UV to illustrate fluorescence; ask quality questions; recognize the importance of explaining data with precision and accuracy; illustrate the interdependence of organisms on one another and flow of energy and matter within their ecosystem; show examples of stability and change in ecosystems and succession; show the effects of human activity on ecosystems.

- **Sustained contact -- yearly learning activities**

- **October 2012 - Sustained learning Activity** - Teachers report on experiences from using the *Discover Life* activities learned in July; species identification; Q & A on natural history as pedagogical tool. Instructors: Drs. Pickering, Jordan and Hill, Ms. Lowe, Mr. Beeching and Mr. Bowling. *Saturday 10am-Sunday 3pm, Instruction Saturday 10am-1pm and 2pm-6pm, Sunday 10am-1pm.* Objectives: Participants will learn new methods for incorporating natural history-related content in standards-based activities from peers within their community of practicing teachers. Location: University of Georgia, Athens -- State Botanical Garden, UGA Remote Sensing and Mapping Lab, Georgia Center for Continuing Education.
- **March 2013 - Sustained learning activity** - Using the *Georgia Natural History Survey* in the classroom. Instructors: Same as in October 2012. *Saturday 10am - Arrive. Report from teachers on challenges to utilizing natural history content in GaPS related activities; using lichens for bioassessment of ecosystem health; uploading data; species identification; evaluation. Departure 5:00pm.* Objectives: Participants troubleshoot difficulties encountered in incorporating natural history related content in GapS related activities from peers within their community of practicing teachers. Participants, having learned to successfully operate a Global Positioning System (GPS) will process that data on a computer. Workshop components include, data collection, creating maps, and overlay GPS data onto other GIS layers. Location: UGA Remote Sensing and Mapping Lab.
- **Monthly photographic field trips throughout the year** - Each participant is responsible for accumulating 50 contact hours with instructors for an award of 5

PLUs. Since 32 are available in the summer program, 10 hours in October, and 8 in the March sustained contact, 50 hours can be accumulated during program time. However, optional evening sessions and monthly field trips throughout the year for those who elect to study natural history beyond the requisite time, or in case learners have conflicts and must make up hours. These field trips are made possible by our instructors' dedication and do not require additional funding from the grant.

- **March-May, 2013 - Site visits to schools of participating teachers** - During the spring of 2013, Dr. Pickering, Ms. Lowe, Mr. Beeching and Mr. Bowling will make themselves available for site visits to assist teachers in the classroom in employing natural history-based learning activities that address the GaPS. We will require these visits to participating high-needs LEA schools.

Description of participants/target population: 20 Georgia teachers, grades 3-12, interested in life sciences; ecology/natural history; environmental biology; environmental health; computer data-base construction; website construction; mathematics; statistics; Global Positioning Systems; meteorology; scientific data collection, analysis and application; engagement in research methodologies (systematic and objective procedures); citizenship/democracy. This workshop will attract educators from all over Georgia but may appeal particularly to teachers in economically depressed areas of the state due to an interest in using lichens to study air pollution and studying climate effects of the urban heat island. We will place special emphasis on recruiting teachers from economically depressed areas or schools or districts where 10% or more of teachers are teaching out of field for part of the day or have non-renewable teaching certificates; and on recruiting teachers from schools which have failed to achieve Adequate Yearly Progress. Teachers from our primary high-needs LEA partners, Atlanta Public Schools, and Griffin-Spalding County Schools will have first priority for available program positions. Other high-needs LEAs will be targeted for recruitment efforts as resources and space in the program are available. The project has a long history of providing learning opportunities to Title I schools, in particular Atlanta Public Schools, which has resulted in a continued formal partnership with APS and the additional new partnership with Griffin-Spalding County Schools. If the grant is funded, we hope to enter into formal partnerships with the other high-needs LEAs in the Georgia's piedmont region.

EVALUATION:

As in 2011, an external evaluation of the project's four-day workshop will be conducted by Cassandra Drennon & Associates, Inc. (CD&A). This educational consulting firm in Athens, Georgia, has considerable expertise in both designing and evaluating teacher professional development programs. Dr. Drennon Bryant is a former state director of teacher professional development in Virginia. CD&A has evaluated numerous teacher professional development grants and consulted with several states on the design and implementation of statewide teacher training systems. Dr. Bryant holds a Ph.D. in Adult Education from the University of Georgia and is trained in both quantitative and qualitative research and evaluation methods.

The evaluation plan has two primary components:

1. The evaluation will measure actual change in teachers and their teaching by evaluating each of the four key outcomes identified for teachers with instruments developed especially for that purpose. To measure the **increase in teachers' content-specific subject area knowledge of natural history**, teachers will take a 20-item pre/posttest on critical content at the beginning and end of the workshop. Responses will be scored by workshop instructors.
2. CD&A will assess teacher satisfaction and gather self-reported outcomes through a participation survey conducted on the final day of the workshop. Teachers will be asked to discuss **increase in knowledge and confidence to use natural history** as a curricular focus in the classroom and to align their teaching with the GaPS.

TEACHER QUALITY HIGHER EDUCATION PROGRAM

Itemized Budget Page 1

CATEGORIES	TQ Funds
Personnel -list people individually (please indicate if the person is 100% soft money in narrative)	
John Pickering, UGA Odum School of Ecology	\$6,000.00
Robert Hill, UGA College of Education	\$2,219.00
Totals carry over to Budget Summary Page automatically Total Personnel Costs	\$8,219.00
FRINGE -list figure amount and % for each person separately	
John Pickering, UGA Odum School of Ecology	\$1,562.50
Robert Hill, UGA College of Education	\$781.00
Tommy Jordan, UGA Franklin College of Arts and Sciences, Geography	\$781.00
Nancy Lowe, UGA Odum School of Ecology	\$5,208.33
Totals Carry Over to Budget Summary Page automatically Total Fringe Costs	\$8,332.83
Support Personnel -list # of graduate assistants, (names if known) consultants, etc.	
Tommy Jordan, UGA Franklin College of Arts and Sciences, Geography	\$2,219.00
Nancy Lowe, UGA Odum School of Ecology	\$20,000.00
Totals carry over to Budget Page automatically Total Support Personnel Costs	\$22,219.00
Participant Costs	
Lodging at Charlie Elliott Wildlife Center, 4-day (3-night) summer workshop	\$1,800.00
Meals at Charlie Elliott Wildlife Center, 4-day summer workshop	\$1,900.00
Lodging at UGA GA Center for Continuing Education, October sustained contact	\$900.00
*Meals at UGA, sustained contact weekends	\$540.00
Parking at UGA, October and March sustained contacts	\$160.00
Totals carry over to Budget Summary Page automatically Total Participant Costs	\$5,300.00

Itemized Budget Page 2	
Travel -list lodging costs, meals, mileage reimbursements, etc. (per person costs)	
Conference room rental, Charlie Elliott Wildlife Center, 4 days	\$1,000.00
Instructor lodging at Charlie Elliott Wildlife Center, 4-day (3-night) summer workshop	\$1,080.00
Instructor meals at Charlie Elliott Wildlife Center, 4-day summer workshop	\$570.00
Instructor lodging (2) at UGA GA Center for Continuing Education, October sustained contact	\$180.00
*Instructor meals at UGA, sustained contact weekends	\$160.00
conference room rentals, sustained contact	\$150.00
Mileage re-imbusement, 6 instructors x \$200 each	\$1,200.00
Totals carry over to Budget Summary Page automatically Total Travel Expenses	\$4,340.00
Additional Costs – List each equipment, food, registration fees, etc. (per person or per school costs)	
	\$3,000.00
Steve Bowling, botanist (subject matter expert)	\$3,000.00
Totals carry over to Budget Summary Page automatically Total Additional Costs	\$6,000.00
Evaluation Costs —List external evaluator and associated costs. If the external evaluator is from your home institution, please place expenses under the Personnel and Fringe sections. If the external evaluator is not from your home institution, list those fees here. Other cost with all fees associated with the evaluation (ie. transcription fees,travel, etc.)	
Cassie Drennon	\$3,000.00
Totals carry over to Budget Summary Page automatically Total Evaluation Costs	\$3,000.00
Supplies —please attach a detailed list at the end of this budget	
Cameras -- belong to participants	\$8,400.40
Batteries, 2 per camera	\$1,584.40
Memory cards, 1 per camera	\$508.60
Case, 1 per camera	\$407.00
Flash drives	\$280.00
Totals carry over to Budget Summary Page automatically Total Supplies	\$11,180.40

IMPROVING TEACHER QUALITY PROGRAM

PROPOSED BUDGET SUMMARY

Totals from Itemized Budget will automatically come here

Institution: University of Georgia Odum School of Ecology

Address of Department or School:

Ecology Building, Odum School of Ecology, Athens, GA 30602

Budget Office Address:

Room 106C Ecology Building, Odum School of Ecology, Athens, GA 30602

Contact Person in Budget Office (Name and telephone #):

Brenda Mattox 706-542-8886

Project Title:

Administrative Financial Director

TEACHER QUALITY CATEGORIES TO BE USED ON ALL INVOICES	Requested TQ Funds
1. Personnel	\$8,219.00
2. Fringe	\$8,332.83
3. Support Personnel	\$22,219.00
4. Participant Costs	\$5,300.00
5. Travel	\$4,340.00
6. Additional Costs	\$6,000.00
7. Evaluation Costs (at least 3%)	\$3,000.00
8. Materials and Supplies	\$11,180.40
9. Total Lines 1-8	\$68,591.23
10. Indirect Costs All subgrants should use one of the two following indirect cost calculations, whichever is lower: 1) 8%, excluding tuition or 2) the institution's federally negotiated indirect cost rate.	\$5,487.46
Grand Total (9 & 10)	\$74,078.69

DETAILED BUDGET

Personnel		\$8,219.00
John Pickering, Odum School of Ecology	\$6,000.00	
Robert Hill, College of Education	\$2,219.00	
Fringe		\$8,332.83
John Pickering, Odum School of Ecology	\$1,562.50	
Robert Hill, College of Education	\$781.00	
Tommy Jordan, Franklin College of Arts and Sciences	\$781.00	
Nancy Lowe, Odum School of Ecology	\$5,208.33	
Support Personnel		\$22,219.00
Tommy Jordan, Franklin College of Arts and Sciences	\$2,219.00	
Nancy Lowe, Odum School of Ecology	\$20,000.00	
Participant Costs		\$5,300.00
Charlie Elliott lodging 10 rooms x \$60 x 3 nights	\$1,800.00	
sustained contact lodging Ga Center 10 rooms x \$90	\$900.00	
Charlie Elliott full day meals 20 x \$29/day x 2 full days	\$1,160.00	
Charlie Elliott meals day-1 20 x \$23 (lunch \$8; dinner \$15)	\$460.00	
Charlie Elliott meals day-4 20 x \$14 (breakfast \$6; lunch \$8)	\$280.00	
sustained contact meals 20 x \$27/person	\$540.00	
sustained contact parking Ga Center 20 x 1 day x \$8	\$160.00	
Travel		\$4,342.00
Charlie Elliott Wildlife Center conference room 4 days x \$250/ day	\$1,000.00	
lodging instructors Charlie Elliott \$60/night x3nights X 6 rooms	\$1,080.00	
Charlie Elliott full day meals 6 instructors x \$29 / day x 2 full days	\$348.00	
Charlie Elliott meals day-1 6 instructors x \$23 (lunch \$8; dinner \$15)	\$138.00	
Charlie Elliott meals day-4 6 instructors x \$14 (breakfast \$6; lunch \$8)	\$84.00	
sustained contact lodging instructor Ga Center 2 rooms x \$90	\$180.00	
sustained contact meals 6 instructors x \$27/person	\$162.00	
conference room rentals, sustained contact	\$150.00	
mileage reimburse 6 instructors x \$200 each	\$1,200.00	
Additional Costs		\$6,000.00
Sean Beeching, lichenologist	\$3,000.00	
Steve Bowling, botanist	\$3,000.00	
External Program Evaluation		\$3,000.00
Drennon & Associates	\$3,000.00	
Supplies		\$11,180.40
cameras (20 x \$420.02 each)	\$8,400.40	
batteries 2 per camera, 40 x \$39.61	\$1,584.40	
memory cards 1 per camera, 8GB 20 x \$25.43	\$508.60	
camera bags 20 x \$20.35	\$407.00	
flash drives \$14 x 20	\$280.00	
	Subtotal of direct costs	\$68,593.23
	Indirect costs at 8% of direct costs	\$5,487.46
	TOTAL	\$74,080.69

APPENDIX 2: BUDGET NARRATIVE

PERSONNEL

1. **Dr. John Pickering.** The project director will oversee the project, conduct the workshops in July 2012 (4 days) and on 2 sustained contact weekends (October 2012, March 2013), and market the program at conferences.

Total \$6,000 summer salary.

2. **Dr. Robert Hill.** As the originator of this project as "Liking Lichens," Dr. Hill has years of expertise adapting the study of natural history and ecology to Georgia Performance Standards in science. He will guide the development of new activity pages and lesson plans for teachers at all grade levels.

Total \$3,000 summer salary.

FRINGE BENEFITS

Usual and customary at University of Georgia for **Pickering** (\$1,562.50), **Lowe** (\$5,208.33), **Hill** (\$781.00) and **Jordan** (\$781.00).

SUPPORT PERSONNEL

1. **Ms. Nancy Lowe,** Outreach Coordinator. The teacher quality workshop will require an outreach coordinator to administer the grant, recruit and market the workshop at conferences, communicate with and register participants, update standards-based activities, help teach workshops, provide technical support to the teachers, build local identification guides to the species at participating schools, produce instructional videos and web pages, and oversee data quality. 10 months@ 20 hours/week = \$20,000.
2. **Dr. Tommy Jordan,** Remote Sensing and Mapping. The project requires expertise in geographic positioning systems and mapping. His lab hosts the Georgia Lichens Project website and the sustained contact sessions. Amount reflects technical support and salary. 6 days/year X \$500 = \$3,000.

PARTICIPANT COSTS

1. Lodging at Charlie Elliott Wildlife Center, for summer workshop, 10 rooms (20 participants / 2 per room) x 3 nights x \$60 per night = \$1,800

2. Meals at Charlie Elliott Wildlife Center, for summer workshop, 4 days:
(Breakfast @\$6, Lunch @\$8, Dinner @\$15)
Day-1 lunch and dinner for 20 = $(\$8 + \$15) \times 20 = \$460$
Day-2 breakfast, lunch and dinner for 20 x $(\$6 + \$8 + \$15) = \580
Day-3 breakfast, lunch and dinner for 20 x $(\$6 + \$8 + \$15) = \580
Day-4 breakfast and lunch for 20 = $(\$6 + \$8) \times 20 = \$280$
Total participant meals for all 4 days = \$1,900
3. Lodging at GA Center for Continuing Education, October sustained contact
10 rooms (20 participants / 2 per room) x \$90 per room x 1 night = \$900
4. Meals for sustained contact weekends, 4 meals (3 in October, 1 in March) for 20 participants = \$540
5. Parking at UGA, October sustained contact @ estimated \$8 per day x 20 participants = \$160

TRAVEL

1. Charlie Elliott Wildlife Center Conference Room Shepherd Building C
= \$250/day x 4 days = \$1,000
2. Instructor lodging at Charlie Elliott Wildlife Center, for summer workshop,
6 rooms x 3 nights x \$60 per night = \$1,080
3. Instructor meals at Charlie Elliott Wildlife Center, for summer workshop, 4 days:
(Breakfast @\$6, Lunch @\$8, Dinner @\$15)
Day 1 lunch and dinner for 6 x $(\$8 + \$15) = \$138$
Day 2 breakfast, lunch and dinner for 6 x $(\$6 + \$8 + \$15) = \174
Day 3 breakfast, lunch and dinner for 6 x $(\$6 + \$8 + \$15) = \174
Day 4 breakfast and lunch for 6 x $(\$6 + \$8) = \$84$
Total participant meals for all 4 days = \$570
4. Instructor lodging for 2 out of town instructors at UGA GA Center for Continuing Education, October sustained contact 2 instructors/ 1 instructor per room = 2 rooms x \$90 per room x 1 night = \$180
5. Instructor meals for sustained contact weekends, 4 meals (3 in October, 1 in March) for 6 instructors = \$160

6. Mileage re-imbursement to instructors for driving to Charlie Elliott Wildlife Center, driving to 2 sustained contact weekends, driving to planning meetings, driving to conferences to market workshop to teacher participants @\$200 per instructor x 6 instructors = \$1,200

ADDITIONAL COSTS

1. **Mr. Sean Beeching**, Lichen Specialist. The specialized nature of lichen identification, and pollution detection using lichens requires the focused expertise of Mr. Beeching. Consultant fee @ \$25/hour = \$3,000.
2. **Mr. Steve Bowling**, Plant Specialist. The specialized nature of plant identification, and using plants to understand habitats requires the focused expertise of Mr. Bowling. Consultant fee @ \$25/hour = \$3,000.

Both Mr. Beeching and Bowling will participate in teaching all the workshops. They will help the teachers identify the species that they photograph and will build local on-line identification guides for lichens and plants at participating schools.

EVALUATION COSTS

Dr. Cassie Drennon Bryant, Evaluator. Participant evaluation from an expert will assist in project evaluation and future program planning. Evaluator is a small business/minority owner. 6 staff days @ \$500/day = \$3,000 (evaluation of the 4-day workshop in July, 2012).

SUPPLIES

1. Sony Cyber-shot cameras with good macro function, for photographing insect, plant, and lichen details = $420.02 \times 20 = \$8,400.40$
2. Batteries, 2 per camera = $\$39.61 \times 40 = \$1,584.40$
3. Memory cards for cameras, 8GB, 1 per camera = $\$25.43 \times 20 = \508.60
4. Camera bags = $\$20.35 \times 20 = \407
5. Flash drives = $\$14 \times 20 = \280

APPENDIX 3: CAPACITY

FACULTY & SUPPORT PERSONNEL:

- **John Pickering - Project Director**

University of Georgia, Odum School of Ecology, Athens, GA 30602-2602; Email: pick@discoverlife.org. Education: Ph. D. 1980, Harvard University (Biology); M. A. 1976, Harvard University (Biology); B. A. 1973, University of Illinois (Honors Biology). Employment: Faculty member at the University of Georgia in Entomology (1984-95) and Ecology (1994-present). Research Interests: Understanding the impact of weather, invasive species and other large-scale ecological factors on species and their interactions. Passion: *Discover Life* (www.discoverlife.org), a website to assemble and share knowledge in order to improve education, health, agriculture, economic development, and conservation throughout the world. Selected Publication: Hargrove, W. W. and J. Pickering. 1992. *Pseudoreplication: a sine qua non for regional ecology*. *Landscape Ecology* 6: 251-258.

- **Robert J. Hill - Project Co-director**

University of Georgia, Department of Lifelong Education, Administration, & Policy, Athens, GA 30602-4811; Email: bobhill@uga.edu. Education: D. Ed. 1997, Pennsylvania State University - (Environmental) Adult Education; M. A. 1989, State University of New York (Environmental) Ethics; M. A. 1975, University of Wyoming, Department of Botany; B. S. 1973, Millersville State University, Biology Education. Employment: The University of Georgia, - Areas of expertise: Adult and Community Environmental Education; Citizen Science; Continuing professional education with pre- and in-service P-16 instructors (educator training); Selected Publication: (1999). *Lichens: Neglected Opportunities for Environmental Education Programs*. Harrisburg, PA: The Department of Conservation and Natural Resources. (A lichen curriculum for science educators).

- **Thomas J. Jordan - Technology Director**

University of Georgia, Center for Remote Sensing and Mapping Science, Department of Geography, Athens, GA 30602; Email: tjordan@crms.uga.edu. Education: B. S. 1979, University of Georgia, Athens, (Geography); M. A. 1981, University of Georgia, (Geography, Photogrammetry); Ph. D. 2002, University of Georgia (Geography,

Softcopy Photogrammetry). Employment: University of Georgia, Associate Director, CRMS, Department of Geography. Research Interests: Use of satellite and aerial photographs in digital formats for mapping, softcopy photogrammetry, software development related to mapping, integration of GIS and remote sensing techniques for natural resource monitoring, Global Positioning System. Selected Publication: (2002). Softcopy Photogrammetric Techniques for Mapping Mountainous Terrain: Great Smoky Mountains National Park. Doctoral Dissertation, University of Georgia, 193 pp.

- **Cassandra Drennon Bryant - External Evaluator**

Dr. Bryant will evaluate for the project. Education: She has a Ph. D. in adult education from UGA where she was trained in both quantitative and qualitative research and evaluation methods. Employment: Dr. Bryant is particularly well suited to evaluate the proposed teacher quality grant. She is the former state director of professional development in Virginia. She designed and delivered professional development for Georgia teachers from 1995-1999. Established in 2000, *Drennon & Associates* has considerable expertise in both designing and evaluating teacher professional development programs; they recently designed a statewide teacher training system in Rhode Island, and currently are completing a comprehensive evaluation of Pennsylvania's statewide professional development system.

- **Ms. Nancy L. Lowe - Outreach Coordinator**

Ms. Lowe is *Discover Life's* Outreach Coordinator. Her expertise ranges from scientific illustration, making instructional videos and web pages, coordinating people, to building on-line identification guides of plants. For the past three years she has been helping to teach science, art, photography and environmental awareness. This past summer she helped teach Dr. Hill's workshops at Charlie Elliott Wildlife Center.

- **Mr. Sean Q. Beeching - Lichen Specialist**

Mr. Beeching is a lichenologist and consultant from Atlanta. He is a member of the Tuckerman Foray, a group of international lichenologists who conduct an annual fieldtrip in the eastern U.S. and adjacent Canada. His specific expertise is in lichens of the southeast USA. As collector of a new species, *Megalaria beechingii* Lendemer, sp. nov., he has been honored by it bearing his name. Since inception over five years ago he has helped teach Dr. Hill's workshops on 'Liking lichens (and other biota)'.

- **Mr. Steve Bowling - Botanist**

Mr. Bowling has over 50 years experience identifying plants in Georgia, primarily with Golder and Associates delineating wetlands. This past year he has worked with *Discover Life* building on-line plant guides and identifying photographs. In the summer he helped teach Dr. Hill's workshop at Charlie Elliott Wildlife Center.

- **Mr. Todd Nickelsen - PLU Supervisor**

Coordinator, Oconee River Georgia Youth Science & Technology Center at Northeast Georgia Regional Educational Service Agency, 375 Winter Street, Winterville, GA 30683

FACILITIES:

- **UGA's Odum School of Ecology** will administer the grant. It also houses *Discover Life* that will support the project with on-line tools to help teachers and their to students collect, manage, analyze and share data. These tools include identification guides to lichens, moths, caterpillars, ladybugs, pollinators and plants; mapping software, and albums to store photographic data. For an example of how these tools are integrated with our research and teaching protocols, see *Nothing* -- <http://www.discoverlife.org/moth>. Since inception Discover Life has had over a billion hits and currently serves a million pages and images daily. In September 2011, it provided information to 368,000 IP addresses. It serves as the electronic clearinghouse for the Georgia Natural History Survey and has the capacity to meet all the anticipated web requirements of this proposal.
- **UGA's College of Education (COE)** is accredited by the National Council for Accreditation of Teacher Education (NCATE). Perennially ranked among the nation's top research-extensive institutes, the College continues to be a center for innovative research, teaching and service projects of local, national and international interest. Programs in the Department of Lifelong Education, Administration, & Policy within COE prepare leaders who create educational knowledge, policy, systems and strategies to improve the quality of life of individuals, organizations and the communities in which they live.
- **UGA's Center for Remote Sensing and Mapping Science (CRMS)** undertakes interdisciplinary research projects requiring the development of image and map data processing technologies for applications in the physical, biological and mapping sciences. In 1998, the CRMS was named a *NASA Center of Excellence* (see

<http://www.crms.uga.edu/nasa.htm>). Specialties of the Center's multidisciplinary staff that encompass the full range of geographic information science include remote sensing/digital image processing, digital photogrammetry, image interpretation, geographic information systems, Global Positioning System surveys and software development focused on applications in ecology, forestry, geography, geology and hydrology.

- **Cassandra Drennon & Associates, Inc.** is an educational research and evaluation firm located in Athens that specializes in evaluating adult education programs. CD&A clients include higher education, K-12 public school systems, state and federal agencies, private foundations and corporations.

CONTRIBUTIONS BY HOST INSTITUTIONS:

- **UGA's Odum School of Ecology** will provide printing and photocopying resources, and indirect costs such telephone use, postal mailings, email support, administrative office space, clerical assistance to conduct the program, as well as use of meeting rooms. This support is valued at approximately \$3,800. *Discover Life* will provide the project with all the web support that it needs.
- **UGA's Center for Remote Sensing and Mapping Science** will provide the venue for the two extended contact meetings. We will use the Department of Geography's computer lab and classrooms for lectures and hands-on GIS-training using licensed software and high-powered microscopes for in-depth work. In-kind support = \$3,000.
- **Oconee River Georgia Youth Science & Technology Center** at Northeast Georgia Regional Educational Service Agency: Potentially 24 teachers each receiving 5 PLUs @ \$35/hour = \$5,250 in kind support.
- **Invited external specialists** attending the July session. Note: For the past grants, such specialists have included Joel Dios Mercodo, from the University of Puerto Rico; Nora Casey, from the University of Dublin; Curtis Hanson, University of Alabama; and Gary Perlmutter, from North Carolina State, and Steve Bowling of Golder and Associates. Value of waived consultant fee = \$3,000 in-kind support.



The University of Georgia

College of Education

*Department of Lifelong Education, Administration, and Policy
Programs of Adult Education, Educational Administration & Policy, and
Qualitative Research*

October 20, 2011

Re: Letter of Support for Renewal of **Liking Lichens (and other Biota): Applying Ecological Knowledge to Georgia's Performance Standards in Science**

Dear Dr. Thompson,

I am pleased to write a letter of support for Dr. John Pickering of the Odum School of Ecology in support of the "**Lichens (and other Biota): Applying Ecological Knowledge to Georgia's Performance Standards in Science**" project.

This project has an impressive track record of successful instruction for GA science educators, and strongly encourages and promotes professional development and continuing education for classroom application. Dr. Pickering's proposal embraces these desired processes and outcomes by providing the learning experiences that will increase science content knowledge and instructional strategies for classroom teachers based on the GA Performance Standards in Science.

My anticipated role is scientific consultant on biodiversity education. As the former PI for this grant, for multiple years, I can attest that it will be professionally executed with teachers' classroom performance the heart of the workshop and the sustained contact activities.

It is my hope that you will find merit and value in Dr. Pickering's proposal and consider it deserving of funding. In the event you have any questions or concerns, please do not hesitate to contact me.

Sincerely,

Robert J. Hill

Associate Professor

The Department of Lifelong Education, Administration and Policy



The University of Georgia

October 24, 2011

To Whom It May Concern:

The Center for Remote Sensing and Mapping Science, Department of Geography, University of Georgia, has been involved with Teacher Quality grants under the “Liking Lichens” series of projects as Co-PI’s since the first year. As part of the grant, we offered computer expertise, instruction in field methods, mapping and global positioning systems technologies, and database and web management. In addition, we provided classroom and laboratory space, including the use of our computer systems and high-powered microscopes for the Sustained Contact Weekend classes.

We intend to continue this level of support as cooperators in the new proposal, “Discover Life: Applying Ecological Knowledge to Georgia's Performance Standards in Science” being submitted by John Pickering and Nancy Lowe.

Sincerely,

Thomas R Jordan, Ph.D.
Associate Director
ASPRS Certified Photogrammetrist #1308
ASPRS Certified Mapping Scientist-GIS/LIS #R184GS

Marguerite Madden
Director and Professor

Cassandra
Drennon
ASSOCIATES

EDUCATIONAL
CONSULTANTS

October 21, 2010
Dr. Kathy Thompson
Teacher Quality Office c/o Clarice Thompson
372 Aderhold Hall
The University of Georgia
Athens, GA 30602

Dear Dr. Thompson:

This letter is sent in support of the grant proposal, "*Discover Life: Applying Ecological Knowledge to Georgia's Performance Standards in Science*," which has been submitted by Dr. John Pickering, University of Georgia. As the external evaluation consultant, I am pleased to have worked with this program for several years and can vouch for its many successes.

In this past year's workshop for this same project, former Project Director Dr. Bob Hill invited Dr. Pickering to add science education methods from Discover Life, using digital photography, web tools, and expanded groups in natural history to examine large-scale ecology questions. The teachers responded very positively to this added content. I am delighted to evaluate this project for another year.

I support this proposal without reservations. If you would like further comment, please feel free to contact me at 706-543-2971 or via email at cassie@drennonassoc.net

Sincerely,



Cassandra Bryant, PhD
President



**OCONEE RIVER
GEORGIA YOUTH SCIENCE & TECHNOLOGY CENTER
375 Winter Street, Winterville GA 30683**

October 21, 2010

Dr. Kathy Thompson
Teacher Quality Office c/o Clarice Thompson
372 Aderhold Hall
The University of Georgia
Athens, GA 30602

Dear Dr. Thompson:

This letter is sent in support of the grant proposal, “*Discover Life: Applying Ecological Knowledge to Georgia’s Performance Standards in Science*,” which has been submitted by Dr. John Pickering, University of Georgia. As the Regional Coordinator of the Oconee River Georgia Youth Science & Technology Center (OR GYSTC) at Northeast Georgia Regional Educational Service Agency (RESA), I am pleased to have worked with this program for several years and can vouch for its many successes.

With the changes to the state science curriculum, this program has helped to provide valuable hands-on training to teachers. Insects, plants and lichens are important groups in ecology but are seldom utilized by educators. The proposal has a distinctive combination of subject matter, including ecology, environmental science, technology, computer and database applications, civic engagement and citizenship, environmental policy, and research.

Multiple stakeholders include teacher training experts (the UGA College of Education), geospatial technology experts (Center for Remote Sensing and Mapping Sciences); botany and lichenology expertise (subject matter specialists); knowledge of marketing, promoting, and conducting educator workshops (Oconee River Georgia Youth Science & Technology Center [GYSTC] at Northeast Georgia RESA, and the Education program); cooperation with LEAs, and program evaluation (Drennon & Associates, a business partner working with GA school districts on program evaluations).

Participants will earn 5 hours of Professional Learning Units and receive digital cameras for application in their teaching. The Oconee River Georgia Youth Science and Technology Center at Northeast Georgia RESA offers support by actively soliciting teachers within our school systems to participate in the course, advertising the class in our workshop offerings bulletin, and issuing the Professional Learning Units to educators as in-kind sharing of responsibilities.

I support this proposal without reservations. If you would like further comment, please feel free to contact me at 706-742-8292 or Todd.Nickelsen@negaresa.org.

Sincerely,

Todd R. Nickelsen
Regional Coordinator
Oconee River Georgia Youth Science & Technology Center
at Northeast Georgia RESA



Making A Difference

MATHEMATICS AND SCIENCE DEPARTMENT
130 TRINITY AVENUE, S.W.
ATLANTA, GEORGIA 30303-3624
(404) 802-2306
(404) 802-1303

October 21, 2010
Dr. Kathy Thompson
Teacher Quality Office c/o Clarice Thompson
372 Aderhold Hall
The University of Georgia
Athens, GA 30602

Dear Dr. Thompson:

This letter is sent in support of the grant proposal, "***Discover Life: Applying Ecological Knowledge to Georgia's Performance Standards in Science***," which has been submitted by Dr. John Pickering, University of Georgia. As the Director of Math and Science for Atlanta Public Schools, I am pleased to have worked with this program for several years and can vouch for its many successes.

Helping teachers to engage their students in doing real hands-on research enhances science teaching at many grade levels. The new inclusion of digital cameras and online tools for collecting real science data is further incentive for participation of APS science teachers. We are especially encouraged by the new package for teaching quantitative analysis, using the moth project at <http://www.discoverlife.org/moth/analysis.html>.

The Atlanta Public School system offers support by actively soliciting teachers within our school systems to participate in the course, and advertising the class in our announcements and bulletins to teachers.

I support this proposal without reservations. If you would like further comment, please feel free to contact me at 404-932-5692 or at aporter@atlantapublicschools.us.

Sincerely,

Dr. Alfred Porter
Director of Math and Science
Atlanta Public Schools

BOARD MEMBERS

Mrs. Barbara Jo Cook
James A. "Pete" Graham
Zachery Holmes
Michael Kendall
James Westbury

CURTIS L. JONES, JR., Superintendent



216 South Sixth Street
P. O. Drawer N
Griffin, Georgia 30224
Phone: (770) 229-3700
Fax: (770) 229-3708
www.spalding.k12.ga.us

Accredited by SACS and GAC

October 21, 2011

Dr. Kathy Thompson
Teacher Quality Office c/o Clarice Thompson
375 Aderhold Hall
The University of Georgia
Athens, GA 30602

Dear Dr. Thompson:

This letter is sent in support of the grant proposal, "*Discover Life: Applying Ecological Knowledge to Georgia's Performance Standards in Science*," which has been submitted by Dr. John Pickering, University of Georgia. As the Griffin-Spalding County School System's Deputy Superintendent for Spalding County, I am excited to be on board to support this ongoing project.

Spalding County is excited to be part of this project, as a way for local teachers to take advantage of the local UGA Griffin campus. By using natural history, digital photography, web tools, and activities to teach analysis, this project will enhance science teaching at many grade levels. We support the inclusion of so many stakeholders from science education, science research, mapping technology, subject matter experts in natural history, and a seasoned team of workshop leaders.

The Griffin-Spalding County School system offers support by actively soliciting teachers within our school systems to participate in the course, and advertising the class in our announcements and bulletins to teachers.

I support this proposal without reservations. If you would like further comment, please feel free to contact me by phone or email.

Sincerely,

A handwritten signature in blue ink that reads "Denise Burrell".

Denise Burrell
Deputy Superintendent for Curriculum and Instruction
Griffin-Spalding County School System
770-229-3710 ext. 370
denise.burrell@gscs.org