

## 2015 Five-Year Plan for the Development of the Ecological Research and Education Center (EREC)

### Introduction

**Vision:** EREC is a unique field station linked both directly and through advanced telecommunications to researchers, teachers, students, and citizens at a local-to-global scale. EREC advances our knowledge of the natural and human-modified world and expands the general awareness and understanding of the scientific enterprise.

**Mission:** EREC functions as a highly connected node in the regional and national ecological research and education network. EREC facilitates research, education, and community engagement, strongly emphasizing their integration. Its accessible suburban location in the heart of the Bluegrass provides a hub for studies of the Bluegrass ecoregion.

EREC has a unique niche in combining three unusual and important features. First, EREC is the only research-oriented field station in the Bluegrass Ecoregion, which constitutes the ecological context of the Bluegrass World Heritage Site. Second, EREC is conceived around a tight relationship between front-line research and K-12 education, as implemented through School-Powered Academic Research in Kentucky, the SPARK program. Third, EREC occupies a suburban location, including a mix of native and invasive species characteristic of these environments where so many people live—and providing special opportunities through BIOTIC community engagement. See the EREC website (<http://darwin.uky.edu/~erec>) for more on topics addressed in this plan.

Primary goals for EREC development over the next five years:

- Expand research productivity, funding, training, and coordination
- Upgrade research facilities
- Initiate long-term data sets
- Build SPARK and develop the research-education interface
- Build BIOTIC community engagement
- Seek financial sustainability for the field station
- Establish and maintain an effective staff
- Maintain and develop the ERF/EREC landscape
- Expand course offerings and establish a summer program
- Implement metrics to measure progress

### History

The main benchmarks in the development of EREC and its primary field research site (the Ecological Research Facility, ERF) are summarized in Box 1.

### Box 1. EREC Timeline

1972	McCullough Farm (eventual ERF/EREC site) deeded to UK as a bequest
1988	1-acre Aquatic Research Facility (ARF) funded and built adjacent to the UK campus via NSF-EPSCoR (PH Crowley, PI)
1989-93	4 years of NSF REU Site grant funding for undergraduate research at ARF (PH Crowley, PI)
1993-95	ARF demolished for road-widening; in exchange by agreement with UK administration, ERF is founded on 52 acres of the McCullough Farm property; a laboratory module is built, and 16 small and 3 large artificial ponds and an Artificial Stream Facility are constructed
1995-now	Research is conducted at ERF by 11 faculty members from 3 universities, 4 postdoctoral personnel, 22 graduate students, and many undergraduates; instructional activity at ERF, intermittent initially, is now substantial, including both UK and nearby Transylvania University
1995	The first research aviaries are constructed; there are now 25
2008	The Mesocosm Facility is built adjacent to the Artificial Stream Facility
2009	A second research module and additional aviaries are constructed to accommodate the research of the incoming Chair of Biology Cassone
2010	Invasive plants are replaced by natives in 3 fields; each is divided into three ~1 ha subfields mowed to produce replicate successional seres
2010-12	A former library building is purchased by UK and renovated with the help of a major donation from Lexmark for use in connection with ERF, biology teaching, and teacher-training by UK PIMSER (Partnership Institute for Mathematics and Science Education Reform)
2010-now	A new laboratory component of the ecology course required for the 1500 UK biology majors begins using the field station (4000 student-hours per semester in fall, 2015)
2011-14	A 3-year NSF REU site project is conducted partly at ERF (DF Westneat, PI)
2012	Sargent is appointed ERF (EREC) Manager
2013	ERF is incorporated into EREC and Crowley is appointed EREC Director BIOTIC community engagement is organized
2014	An NSF FSML field station planning project for EREC is initiated, with two workshops held in 2015
2015	The EREC staff is expanded and re-organized as a Director and 3 coordinators
2015-now	Many new research, education, and engagement projects are underway, as summarized in this plan

## Current Situation and Plans

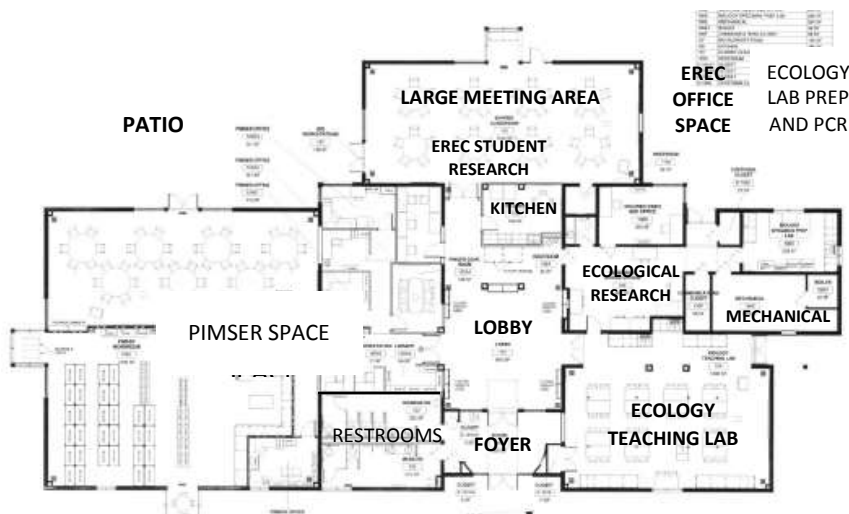
### Facilities

#### Current

ERF, though small in area relative to field sites at most field stations, has sufficient habitat and biota for addressing the main research themes (noted below) to enable the continuing expansion of field studies there (Figure 1). The long-standing emphasis on semi-field studies (i.e. outdoor experiments in artificial systems) at ERF is evident in the arrays of artificial streams, mesocosms, ponds, and aviaries. With direct access to a major road artery into central Lexington, The UK-Lexmark Building (L-UK) and ERF are accessible for research, instruction, teacher training, and community engagement from central Lexington without having to incorporate housing for visitors. EREC is also easily accessible across the Bluegrass and beyond via the N-S (I-75) and E-W (I-64) highways 5 minutes away by car.



**Figure 1.** The Ecological Research and Education Center (EREC), including the UK/Lexmark (L-UK) building and its immediate surroundings (parking, barn, garden, lawn) and the Ecological Research Facility (remainder of the area bounded by white lines). Heavy white lines indicate fence. Main facilities and the ten research fields are shown; the three successional fields each contain three subfields at different stages of a 3-year successional sequence. The western gate allows pedestrian traffic outside the fence from surrounding neighborhoods but permits only authorized vehicles to enter. The white star in field 8 shows the location of the weather station.



**Figure 2.** Floor plan of the UK/Lexmark Center for Educational Innovation (L-UK). Five rooms are dedicated to ecological research and instruction. The foyer, lobby, kitchen, restrooms, patio, and large meeting area are shared with the PIMSER group that occupies the remaining space.

The interior space at L-UK (Figure 2), along with opportunities for teaching and collaboration with the PIMSER group, have generated a burst of new initiatives that dovetail with research at ERF. An array of research computers allows on-site modeling activities intended to link tightly with ERF empirical studies. The large lawn and patio behind L-UK can accommodate picnics and other community engagement events, and the grassy area north and west of the Barn will soon be the site of a community garden.

Summer/Fall 2015 and Planned (\* to be funded extramurally)

- Repair the mesocosm and artificial stream facilities at ERF, damaged by heavy snow in the winter of 2015 (completed summer 2015)
- Finalize a site maintenance plan with UK Physical Plant (done summer 2015)
- Install a wifi/solar weather station (completed summer 2015)
- Install a secure fence around ERF (completed fall 2015)
- Install a complete-coverage wifi system at ERF connected by fiber to the UK/Lexmark Building (Phase I [front 10 acres] completed fall 2015; \*phase II [back 42 acres] planned)
- Establish advanced telecommunications to facilitate multi-site meetings, interactions with schools, regional field-station coordination (in progress)
- \*Construct a greenhouse at ERF
- \*Install servers to manage and distribute data obtained on site
- \*Expand and upgrade the semi-field facilities for remote monitoring
- \*Install tracking towers to document animal distribution and movement

## Funding

### Active

- Research grants funding research at EREC: Cassone (\$1M/4 yrs, NIH); Westneat (\$670K/4 yrs); Sargent (\$30K/1 yr, KSEF); White (\$450K/3 yrs, USDA)
- HHMI Science Education Grant (Cassone; \$1.9M/5 yrs) contains components conducted at EREC
- EREC-sponsored for-fee courses are underway (beekeeping in progress, birding planned for Spring 2016). Under current policy, EREC recruits instructors paid from receipts, with 30% going to the field station.
- The Funkhouser Endowment overseen by the UK Biology Department is modestly supporting EREC activities at about \$7000/yr
- UK support for specific initiatives (e.g. Sustainability/Garden-Science [SGS, see below], wifi and fencing at ERF)

### Planned

- Establish and grow an endowment to support EREC activities. We are working with the UK and College of Arts & Sciences development offices and (soon) the Advisory Board (see below) to achieve this.

- Develop additional revenue-generating instructional activities (for-fee courses, research workshops, teacher training). We solicit ideas and initiatives from affiliated individuals and entities such as PIMSER, from the EREC Committee and the Advisory Board, and from extramural collaborators.
- Seek additional research and educational funding for EREC, with a proportion of indirect funds flowing to EREC. Here too, our community of participants and advisors are a source of productive ideas.

#### Advisory board

An Advisory Board has been established, and an initial meeting is planned for the spring of 2016. The Board's members are: Butch Brodie, Director of Mountain Lake Biological Station of the University of Virginia; James Brown, Lexington-Fayette Urban County Council; David Helm, Fayette County Schools Science Coordinator; Lisa Higgins-Hord, UK Assistant Vice President for Community Engagement; Ann Rypstra, Director of the ERC field station at Miami University of Ohio; David Westneat, UK Professor and Director of Graduate Studies in Biology; Kim Zeidler, Director of the Partnership Institute for Science and Mathematics Education Reform (PIMSER); and a local corporate representative (to be selected). The Board will be chaired by the EREC Director and will have as ex officio members Mark Kornbluh, Dean of the UK College of Arts & Sciences; Beth Wells, Development Office, College of Arts & Sciences; Kelvin O'Dell, Facilities Coordinator, College of Arts & Sciences; and Vincent Cassone, Chair of the UK Biology Department. At semi-annual meetings, the Board will advise on new opportunities, priorities, organizational issues, and funding/development.

#### Administration and staff

##### Current

- Director, 10% Distribution of Effort (DOE). The Director has primary responsibility for the operation and development of the field station by building collaborations, establishing programs, and identifying funding sources. The Director chairs the EREC Oversight Committee that meets approximately monthly and the Advisory Board that meets semi-annually. [Philip H Crowley, PhD Michigan State 1975]
- Coordinator for Technology (CFT), 5% DOE (faculty). This individual works with faculty members, teachers and students who store, access, and transmit data and who use the computers, weather station, and telecommunications equipment. The CFT maintains the EREC server system (to be established), website, and the Twitter and FaceBook accounts. [R Craig Sargent, PhD 1981 SUNY Stony Brook]
- Coordinator for Programs (CFP), 1/3-time postdoctoral appointment. This individual oversees the SPARK program (School-Powered Academic Research in Kentucky) and is responsible for developing new programmatic initiatives, such as the PCR lab and its associated research and instruction, and the planned summer program. [R Louis Hirsch, PhD 2013 University of Arkansas]

- Coordinator for Community Engagement (CCE), ½-time postdoctoral appointment. The CCE oversees the BIOTIC community engagement program, connecting with faculty members, teachers, students, and community leaders to develop and implement science-related educational activities, such as the community garden and K-12 teaching modules. The CCE also organizes group visits and special events. [Megan G Seifert, PhD 2013 University of Florida]

#### Planned

- Director, 10% DOE, one month of summer salary (contingent on funding). The Director will retain leadership responsibilities throughout the calendar year and will oversee the continuing development of summer programs and activities.
- Coordinator for Technology, as above.
- Coordinator for Programs, half-time permanent staff, and otherwise as above.
- Coordinator for Community Engagement, half-time permanent staff, and otherwise as above.
- Summer student workers (3 @ 25 hrs/week, \$10/hr for 13 wks/summer). These workers will provide ad hoc research support and general maintenance, particularly preventing woody-plant encroachment beside paths and fields and around ponds and buildings. They will also learn about research in progress and field station management.

#### Research

##### Emerging themes of research at EREC

- Invasive species (Bray, Calie, Crowley, Deaton, Dobson, Fox, McCulley, Sargent, Seifert, Westneat,)
- Bluegrass species and ecosystems (Calie, Crowley, Gleeson, McCulley, Storfer)
- Global change (Cassone, Crowley, Westneat)
- Adaptive behavior (Calie, Cassone, Crowley, Fox, Sargent, Storfer, Westneat)
- Mutualism/symbiosis (Calie, Crowley, Dobson, Hirsch, McCulley, White)
- Diurnal/seasonal rhythms (Cassone, Westneat)
- Urban ecology (Dobson, Price, Westneat)

UK faculty research at EREC (+ student training: \*=undergrad, \$=graduate, @=postdoc)

Active (described in more detail on the website, <http://darwin.uky.edu/~erec>):

**Vincent Cassone**\*\$@ (Biology): mechanisms of circadian and seasonal clock function and regulation of complex rhythmic behavior

**Philip Crowley**\*\$ (Biology): Pollination and other mutualisms, global change, ecological engineering, disease ecology

**Steven Dobson**@ (Entomology): Mosquitoes as disease vectors, biocontrol

**Scott Gleeson**\$ (Biology): Native Bluegrass trees and grasses

**Rebecca McCulley**\$ (Plant and Soil Sciences): Competition between invasive and native grasses

**Steven Price**<sup>§</sup> (Forestry): Urban ecology; ecology of amphibians, reptiles, and mussels

**Craig Sargent**\* (Biology): Dispersal and invasiveness of fish species

**David Westneat**\*<sup>§@</sup> (Biology): Evolutionary ecology of breeding in birds, behavioral plasticity, parental care

**Jennifer White**<sup>@</sup> (Entomology): Comparative analysis of tree-feeding insects with different endosymbionts

Prospective: **Christopher Barton** (Forestry); **Jeremy Van Cleve** (Biology); **Christopher Schardl** (Plant Pathology); **James Harwood** and **Claire Rittshof** (Entomology)

#### Extramural faculty research at EREC

Active:

**Sarah Bray** (Transylvania University Biology): Invasive plants

**Patrick Calie** (EKU Biology): Native plants, including non-endangered and endangered goldenrod species, grasses and endosymbionts

**Rae Lynn Deaton** (St. Edwards Biology): Endemic and invasive fishes

**Rebecca Fox** (Transylvania University Biology): Behavioral ecology of birds

**Andrew Storfer** (Washington State Biology): Evolutionary ecology and genomics of salamanders

Prospective: **Mark Galatowitsch** and **Anne Lubbers** (Centre College Biology);

**Wendell Haag** (U.S. Forest Service); **William Harris** (Georgetown Mathematics);

**Howard Whiteman**, **David White** (Murray State Biology); **Ann Rypstra** (Miami of Ohio Zoology); **James Wagner** (Transylvania University Biology)

#### Research support initiatives

Long-term datasets:

- Weekly data on weather and soil temperature/moisture conditions will begin in January, 2016.
- Ten mosquito egg traps will be set up and monitored weekly from May-September, beginning in 2016.
- Three 20-m edges of Amur honeysuckle will be monitored in June and September for spread and new stem establishment using stakes and GIS mapping.
- Data for distributions and movement patterns of house sparrows and garter snakes will be gathered across years using tracking towers (pending funding).

Coordination of KOFs research: The EREC Director heads a committee for the Kentucky Organization of Field Stations that is soliciting cross-station research initiatives. For example, the fescue/fungal endosymbiont/herbivory project begun through the SPARK program is being replicated by Eastern Kentucky University, Miami of Ohio, and possibly the Hancock Biological Station at Murray State. Mosquito monitoring is another possibility for cross-station collaboration.

Workshops and Symposia: EREC is beginning a series of once-per-semester research and research/education workshops to be held at the field station. “Strengthening the Research/K-12 Linkage” will be held in Spring 2016, organized by Philip Crowley and Kimberly Zeidler. “Experimental Urban Ecology” is scheduled for Fall 2016, organized by Steven Price. The annual Center for Ecology, Evolution, and Behavior Symposium will be held at EREC for the first time in May 2016. These events include invited extramural speakers, local speakers, poster sessions, catered meals, and informal gatherings to facilitate the exchange of idea.

Facilities improvements: Following extensive consultation with researchers at UK and other institutions in the region, EREC is seeking extramural funds to upgrade its facilities, beginning with the submission of a proposal to the NSF Field Stations and Marine Laboratory Program in January, 2016. The proposal requests funding for the facilities that will have the greatest impact on researcher participation and research quality: an expanded remote-video artificial stream system, a set of moveable tracking towers to follow animal distribution and movement, and a greenhouse to support the fescue studies, invasive plant analyses, goldenrod work, and other pollination studies—with supporting computer facilities. We are also developing a request to the College of Arts & Sciences for a utility vehicle with bush-hog, cultivator, and trailer attachments and a 3/4-ton pick-up truck to transport people and materials on-site and beyond.

## Instruction

### Current

- UK BIO 325 Ecology (Laboratory): The lab/field component of this course taken by almost all of the 1500 biology majors was initiated in 2010 and is now taught exclusively in the ecology teaching lab and ERF at the field station. Beginning in fall, 2015, about 4000 student-hours will be devoted to this component of the course each semester. The labs emphasize contemporary methods (molecular genetics, modeling, field experimentation), statistical analysis, and current research issues (global change, invasive species) and introduce students to research design and hypothesis testing using hands-on approaches.
- UK BIO 559 Ornithology: This course will have the EREC ecology lab as its home base, with explorations of the avifauna at ERF and surrounding field sites.
- Graduate seminar in community engagement UK BIO 770 (Fall 2015 and each Fall term thereafter). Students are introduced to classic work on community engagement from a scientific perspective. They learn about the BIOTIC program and work in small groups on one of the BIOTIC projects or on one of their own devising. The goal is learning to communicate science effectively to the community while adding community engagement to their resumés and future careers. The five projects in Fall 2015 included developing a public event (BioBlast) for UK Biology, initiating a freshman seminar on science and religion



that connects with local clergy, a saw-fly evolution module, video and hands-on biology sessions in local schools with popcorn provided (PopBio), and organizing the EREC community garden.

- UK BIO 395 Independent Research. Every semester several student projects are conducted at EREC/ERF with guidance from faculty members and graduate students. UK BIO 199 Independent Study is the freshman equivalent offered through the NIH-sponsored STEM-Cats program (V.M. Cassone, PI), and several of those students will also be working at EREC/ERF.
- Transylvania University (TU) BIO 4144 Ecology uses ERF for mark-recapture and independent projects as part of the course.
- TU BIO 2164 Ornithology uses ERF for several birding sessions, which sometimes leads to independent field projects at ERF as well.
- TU BIO 2504 Entomology alternates May terms with ornithology. ERF is used for capture and identification of specimens and building a collection from sampling the old fields and ponds.
- For-fee classes for the general public have been initiated at EREC. Courses on beekeeping are regularly scheduled (6 sessions have been held in 2015) and taught by former Kentucky state apiarist Philip Craft. A new course in “Birding” will be taught by Rebecca Fox (Transylvania University), March and April, 2016.

#### Planned

- Summer program: In the summer of 2016, we plan to initiate summer courses (some also available in the academic year, some uniquely summer), expand undergraduate research through REU and the regular independent study courses (e.g. BIO 395), start a volunteer program to be overseen by the Community Engagement Coordinator, initiate an EcoWeek program for teachers and students, and organize for-fee topical courses (to be determined). One of the new courses, listed next, is already scheduled.
- PCR Ecology UK BIO 580 (Summer 2016), to be taught by the Programs Coordinator. This intensive 4-week course consists of several modules to develop and test hypotheses about ecological systems using PCR analysis. Topics include *Wolbachia* strains in the invasive *Aedes albopictus* mosquito, characterizing the diets of spiders of different foraging strategies and habitats, and detecting antibiotic resistance in soil microorganisms. Teachers will be especially encouraged to enroll.
- Advanced ecology UK BIO 525 (Fall 2016). This course taught at EREC involves 5-6 whole-class or multi-group projects designed, conducted, and analyzed by the class in two 3-hour afternoon sessions per week. Example projects include bee foraging and pollination based on field studies and modeling with NetLogo; invasive plant distribution using GIS and control using physical and non-persistent chemical methods; whole-pond replicated nutrient manipulation experiments; and calculating a carbon footprint for ERF.

#### Research-education linkage

## Current

- The newly implemented School-Powered Academic Research in Kentucky (SPARK) program is a centerpiece of our plans for EREC's development, creating and exploiting a tight connection between front-line ecological research and K-12 education. SPARK is being developed in close collaboration with PIMSER (Partnership Institute for Mathematics and Science Education Reform), EREC's neighbor in L-UK (Figure 1); it is led by the CFP. The basic approach is to build a team in each participating school, including the principal, science coordinator, and relevant classroom teachers, and students they designate to participate in an ongoing or planned research project as active collaborators. Then the relevant researchers join the team, and a plan for student collaboration is jointly developed. EREC personnel serve as matchmakers and general coordinators. Research goals and student learning goals are established at the outset, with tangible products (e.g. journal publications, talks and posters) to be produced with student participation and co-authorship. The first of these projects will analyze the protective role of symbiosis in reducing herbivory of grasses, based on observational and molecular-genetic analysis of field plots. The plots will be established in spring 2016 in ERF field 6A (UK researchers Schardl, McCulley, Crowley, and Eastern Kentucky University researcher Calie; focal school—the Lexington STEAM Academy high school).
- The BIOTIC community engagement program (see below) has sponsored presentations at TeacherTalk by researchers on modeling in the classroom and data analysis, to be continued.

## Planned

- The basic design and analysis for the SPARK pilot project on symbiosis and herbivory is to be replicated in Garrard County, Kentucky (led by Calie in collaboration with Garrard County high school), and in Oxford, Ohio (led by Rypstra in collaboration with a high school there). Other SPARK projects are linked to extramural funding requests; priority schools for additional projects include Winburn Middle School and Bryan Station High School and Middle School in Lexington.

## Community engagement (BIOTIC program)

### Current

- With support from the UK Office of Community Relations, a Sustainability/Garden-Science (SGS) module was successfully initiated in two Lexington elementary schools in the spring of 2015. In four monthly sessions at each school, a teacher worked with a UK graduate student and 2-3 UK undergrads to present the concept of sustainability and the science of gardening to a second-grade class. A pre-fab greenhouse and raised beds were constructed at each school. Students followed plant life cycles with their own

growing plants from seed to flowering and vegetable production. Pre- and post-tests demonstrated substantial gains in student understanding.

- A biology tutoring program run by graduate students was piloted at Bryan Station High School in fall 2014 and may soon be re-initiated and expanded
- Catherine Linnen (UK Biology) presented an evolution module at Bryan Station during spring 2015, with an enthusiastic response from teachers and students; a follow-up module was developed in the graduate community engagement seminar.
- Monthly evening TeacherTalk sessions have been held at L-UK addressing topics that link closely to the Next Generation Science Standards (NGSS) being implemented in Kentucky Schools (topics so far: modeling, and data analysis). We plan to use TeacherTalk to launch teaching module development via ad hoc working groups (called DesignX in the BIOTIC program).
- Community members in the neighborhoods surrounding EREC participated in two recent evening sessions at L-UK at which the field station and its activities were introduced to the group, potential interest in a community garden was assessed, and plans were advanced (see Planned below).
- Graduate students and undergraduates conducting research at EREC displayed their research organisms and a simulation model at the fall 2015 Back To School Rally conducted by a neighborhood association adjacent to EREC.

#### Planned

- A community garden will be initiated in spring 2016 at EREC (see Figure 1). Neighbors, church groups, and the students at nearby Winburn Middle School will establish their plots in the spring, with coordination by the CCE and EREC-affiliated faculty and students.
- The SGS program will be scaled up with funding sought from the UK Sustainability Program, followed by an extramural grant submission.
- Funding has been obtained for a citizen science experiment, planned for 2016, testing a contribution to pollination by monarch butterflies to milkweed pollination and identifying and counting pollinators that visit milkweed plants.
- BioArt exhibitions by local and regional artists for the community are scheduled to begin in spring, 2016, led by the CCE. This builds on a new BioArt graduate course first taught in spring, 2015, at UK—and also on the Audubon-inspired mural painted on walls surrounding the L-UK patio by the Italian muralist Hitnes and his master class of local artists (completed October 15, 2015).
- A series of short films and active learning exercises associated with each of several biology research laboratories at UK will be presented in local schools during spring 2016, fueled by popcorn (PopBio, an initiative from the graduate seminar)

- A series of informal demonstrations and discussions with the community on “natives and invasives in the garden” being developed to begin in spring 2016.
- NGSS requires additional teacher training that can proceed in collaboration between EREC and PIMSER. Ideas for this are under development.

### **Budgeting: The 2020 Budget as the Basis for a Business Plan**

A key goal for EREC is to build toward financial sustainability in the year 2020. Here we summarize the major expenses and income that we anticipate in that year, based on 2015 dollars. This summary, together with the full context of the five year plan, amounts to a simplified business plan to be fleshed out in consultation with the advisory board.

Expenses (@contingent on availability of funds; #contingent on extramural funding; \*costs requested from the College of Arts & Sciences)

#### *Personnel*

- @Director one month of summer salary \$12000
- Director teaching release @ 10% DOE 0\*
- Coordinator for Technology service release @ 5% DOE 0\*
- Coordinator for Programs, half time staff 0\*
- Coordinator for Community Engagement, half time staff 0\*
- Summer student workers, 3 @ \$10/hr for ~25 hrs/wk x 13 wks each 10000

#### *Equipment*

- Regular upgrades for communications/data management 9000
- #Newly acquired, project-focused 9000
- Vehicles (3/4 ton pickup and utility vehicle)—annual depreciation 0\*

#### *Travel*

- @Director’s attendance at regional and national field-station meetings 2000

#### *Materials and Supplies*

- Equipment repair 3000
- Computers and computer software 6000
- Tools 2000
- Tubs, tanks, hose, shadecloth, plywood for semi-field facilities 2000
- Miscellaneous laboratory supplies 2000

#### *Support for Meetings and Workshops at EREC (supplemented by academic units)*

- 2 research workshops, 1 research/teaching event, 2 outreach events 5000

Total Annual Expenses (2020) \$97000

Income (<sup>#</sup>contingent on extramural funding)

• <sup>#</sup> Direct grant funding for equipment and supplies listed above	\$15000
• <sup>#</sup> Grant indirect returned to EREC	10000
• Funkhouser endowment	7000
• Summer programs	6000
• For-fee courses and workshops	8000
• Portion of lab fees from courses taught at EREC	6000
• Annual fund-raising event	5000
• New endowment (sought in collaboration with UK Development)	<u>40000</u>
Total Annual Income (2020)	\$97000

**Metrics of Success**

These are the *quantitative* ways that progress at EREC will be assessed:

1. Extramural funding total per annum
2. Number of extramurally funded projects
3. Revenue from services
4. Development: direct donations and endowment building
5. Research meetings, workshops, events, and activities
6. Educational meetings, workshops, events, and activities
7. Community engagement meetings, workshops, events, and activities
8. Research publications, talks, and posters at meetings
9. Student research projects
10. Student-hours in courses taught
11. Affiliated institutions, researchers, and educators
12. Integrative projects and activities—between disciplines, between research and education and between research and community engagement

These are the *qualitative* ways of assessing progress at EREC:

1. Is EREC growing as a node in the national research and education network?
2. Are EREC's activities in line with its programmatic emphases?
3. Is EREC engaging appropriate partners in its work?
4. What impact is EREC having on its principal audiences?

**Primary Goals by Year** (Note: all listed for 2015 have been completed)

- 2015: Repair the mesocosm and artificial stream facilities
- Install a weather station and make data available via internet
- Install the fence surrounding the entire Ecological Research Facility (except field 4)
- Install a wifi system in the 10-acre fenced area at ERF
- Appoint an advisory board and schedule an initial meeting for spring 2016
- Produce a 5-year plan

- Hold two planning workshops and produce reports on what was learned from them
- Re-submit the REU proposal, with more focus on EREC activities
- Visit other field stations to glean ideas (Hancock Biological Station, Murray State; the Ecological Research Center, Miami of Ohio; the Natural Areas, Eastern Kentucky University; the Ohio River field station of Thomas More College; Mountain Lake Biological Station, University of Virginia)
- Build a staff that can support the full range of EREC activities (3 coordinators)
- 2016 Submit a proposal to NSF FSML in January to fund improvements in physical facilities
- Submit proposals in spring 2016 and thereafter to fund the SPARK program, including a possible training grant built around SPARK
- Initiate the once-per-semester workshops and annual CEEB Symposium at EREC
- Initiate a semi-annual newsletter
- Have a permanent half-time Coordinator for Community Engagement appointed to a staff line
- Pilot parts of the summer program (including EcoWeek, for-fee courses, and for-credit courses)
- Re-initiate REU with a new summer group of students (assuming a successful proposal)
- Advance the facilitation/coordination of research linking the Kentucky field stations
- Acquire a utility vehicle with cultivator, bush-hog, and trailer attachments (to be requested from the College of Arts & Sciences)
- Achieve at least one major endowment-building development success
- Have at least one newly funded high-profile grant project centered at EREC
- Initiate construction of a greenhouse at ERF (pending extramural funding)
- Begin construction of an enlarged remote-video stream facility (pending grant funds)
- Erect tracking towers for animals with tiny transmitters (also pending funds)
- 2017 The enhanced stream facility, tracking-tower system, and greenhouse are completed (pending funds)
- Acquire a ¾-ton pick-up truck for people and materials transport (to be requested from the College of Arts & Sciences)
- The workshops and symposium are continuing
- The summer program is fully operational
- A permanent stream supported by a well is constructed between fields 9 and 10
- SPARK, led by the Coordinator for Programs, has demonstrated successes and is expanding in breadth and reach

BIOTIC has extensive involvement of UK students and is recognized by UK and LFUCG, led by the Coordinator for Community Engagement

There are at least three newly funded high-profile grant projects centered at EREC

Instructional activities at EREC, including college/university coursework, for-fee courses, EcoWeek, teacher training, and student research projects, have substantially expanded

2018 EREC has a substantial endowment that funds many of its operations

Development efforts to expand the endowment and create fund-raising initiatives are underway

Workshops and symposium continue

Communications, remote-data, and data management facilities are updated, with contributions from the endowment, extramural funds, and UK

Experimental facilities at ERF are updated with funds from the endowment and UK

A plan is under active development for the most effective use of the un-fenced, most remote area of ERF (possibilities include: development of a native woodland habitat with trails; conducting funded studies on the ecology and control of invasive plants; fencing the area and monitoring its succession without intervention)

2019 EREC has a high regional and national profile for research, education, community engagement, and linkages between them

More workshops and the symposium

EREC's endowment now includes funds to support sabbatical collaborations (remote or on-site) and student scholarships and thesis/dissertation support

With income from grant indirect funds, endowment, for-fee courses and workshops, and fund-raising activities, along with staff lines supported by the College of Arts & Sciences, EREC is self-supporting

EREC has at least 5 newly funded high-profile grant projects, along with continuing projects and smaller grants

The UK-Lexmark Center is updated with funds from UK and other sources

Beginning implementation of the plan for the unfenced, remote area of ERF

**Annual Goals by Quantitative Metric**

Metric / Year:	2015	2016	2017	2018	2019
1. Extramural \$\$/year	\$500K	\$600K	\$750K	\$900K	\$1M
2. Funded projects	5	7	9	12	15
3. Services \$\$	\$2K	\$4K	\$6K	\$8K	\$10K
4. Development \$\$ <sup>#</sup>	---	---	\$0.5M	\$0.75M	\$1M
5. Research activity*	15	20	25	30	35
6. Educational activity*	10	12	15	18	20

7. Community activity*	5	10	12	15	18
8. Research output**	12	15	18	20	25
9. Student research	8	10	12	15	18
10. Student course hours	8000	8200	8400	8500	8500
11. Affiliations***	12	15	20	25	30
12. Integrative activities	5	7	10	12	15

#Endowment funds, assume to produce income @ 4%/year

\*Number of meetings + workshops + events + activities

\*\*Number of publications + talks + posters at meetings based on work linked to EREC

\*\*\*Number of institutions + number of individual researchers and educators affiliated with EREC