I. INTRODUCTION

An ecosystem ecologist is commonly portrayed as a rugged-looking woman or man who records bird songs, digs soil pits, and downloads data loggers in remote field research sites. An ecology educator is typically pictured as a professor who lectures from a university podium or sits on the Board of The Nature Conservancy. A junior woman faculty is often warned not to waste time on an outreach event to the Girl Scouts, as it will not contribute to her tenure decision. These images support the idea that ecosystem ecologists work in isolated field venues and scholarly settings, and interact with people who are already keenly aware of the importance of nature and science.

However, new and exciting of images of ecosystem ecologists will emerge if ideas in this proposal are supported. Picture a group of incarcerated men with tattoos and shaved heads carefully sorting mosses -- when an ecosystem ecologist enters the prison yard to show them a recently published peer-reviewed scientific paper on moss regeneration --- with the prisoners and ecologist as co-authors. Visualize a congregation of Baptists sitting in church, listening to an ecologist at the pulpit report on the many verses in the Old Testament that contain the words "tree" and "forest" to demonstrate the profound importance of trees in Christian lives. Imagine an outreach program in which a senior ecologist engaged a rap singer to help deliver a positive field experience to urban "at-risk" youth, resulting in a report of that project on the splash page of the NSF website – with a link to the .mp3 files of the rap songs they composed.

These three scenarios are real examples of ecosystem ecologists who have carried out research and education as participants in The Research Ambassador Program (www.evergreen.edu/greenprisons; Fisher 2006, Nadkarni 2006, 2007, http://www.livescience.com/environment/090227-bts-arboreal-rap.html). This innovative program has provided appropriate academic rewards for scientists who link their research to an existing interest, trade, or hobby of non-traditional public audiences in non-academic venues (Nadkarni 2004). This directly addresses the need high-level science administrators have recently articulated for scientists to play a larger, more active role in public outreach (e.g., Leshner 2006). This program has generated great excitement in both ecological and informal science education (ISE) realms, because it shows that scientists themselves can shift public engagement from a burden to a benefit. Outcomes included peer-reviewed papers, positive media attention, approval from Deans and Provosts, and a profound sense that they contribute to real-life issues and society at large. Public audiences have gained rewards that include input of scientifically sound information on something they care about, intellectual stimulation, and a greater sense of connection to nature.

However, investment in such a program also represents a high risk on the part of both scientists and funders. Skepticism that researchers can and should engage with public audiences still exists because of the deeply ingrained sense that public outreach lies far beyond the central mission of academics; uncertainty that non-traditional public audiences are interested in or capable of understanding science; and fears that scientists are too introverted, boring, or specialized to communicate with others. Thus, before we can extend the provocative pilot work to mainstream ecosystem ecology, we must carefully explore how to develop the nascent Research Ambassador Program so that our field can -- in unprecedented ways -- respond to the growing advocacy for ecologists to boldly step outside of academia and bridge gaps between science and society, and between nature and humans.

II. STATEMENT OF NEED

Ecosystem ecology provides a powerful framework for identifying ecological mechanisms that interact with environmental problems, such as global CO_2 increases, habitat degradation and loss, and acid rain. In a broader sense, the increasing dominance of technology and virtual reality, and the media's representation of nature as entertainment, has reduced humans' connections to natural ecosystems (Shamos 1995, National Science Board, NSB 2002).

Ecosystem scientists hold critical roles in addressing these problems because they have profound knowledge of the subject matter, and because their own passion about what they study is infectious (Gregory & Miller 1998). However, this potential remains terribly underused because of lack of academic rewards. Rather, the field of ISE has assumed the major role of brokering communication pathways between science and the public (Bell 2008, CAISE 2009). Most occurs with little direct contact with scientists; 80% of NSF support for ISE supports large-scale science education entities (e.g., museums, zoos, films); only 6% goes to university-based programs (Lewinstein et al. 2009). Communication by the popular media is often hindered by fixed deadlines, lack of technical expertise, and the perceived need to sensationalize research results (Friedman et al. 1986, Friedman 2008).

Promising glimmers indicate that scientists themselves <u>can</u> be effective at communication of research to public audiences. Recently, high-level adminstrators have called for greater public engagement by scientists (e.g., Poliakoff & Webb 2007, Davies 2008, Bell et al. 2009). Some key government positions are being filled by scientists (e.g., the President's Science Advisor and Energy Secretary). The Cary Conference in Ecosystem Studies, a premier venue to examine fundamental issues in ecology, is viewed by many in the scientific community as one of the most prestigious international ecological meetings and is regarded as promoting new goals for the field. The 2009 topic was "Effective Communication of Science in Environmental Controversies (http://www.ecostudies.org/cary13/index.html).

Several scientist-oriented outreach programs were recently established: e.g., *a) Aldo Leopold Leadership Program* prepares environmental scientists to engage with the policy-makers and the media; *Citizen Science* brings together scientists and scientifically aware volunteers to perform research-related tasks that may be used by an academic scientist (e.g., *Project FeederWatch*). The *AAAS Center for Public Engagement with Science and Technology* increases public input via town hall meetings on scientific topics, webinars, and in-person workshop resources to provide general help. The *Portal to the Public* project (Pacific Science Center) combines ISE professionals, scientists, and public audiences in science museums to communicate science (http://www.pacsci.org/portal/).

Despite this progress, public outreach by scientists is still only minimally valued within the reward system recognized by scholars. Universities and grant-making agencies favor researchers with a single-themed, closed door approach (Leshner 2003).Only a tiny fraction of the nation's research scientists are involved in the new science outreach programs, and even their own project leaders acknowledge that such approaches do not easily integrate into other university programs. Most are offered sporadically; all are directed toward scientists who have outreach proclivities; and none is specific to ecosystem studies.

Most critically, when scientists disseminate their research to the public, their audiences are almost always segments of the public that are <u>already</u> interested and knowledgeable about science – the "scientifically aware" or "active" (e.g., natural history groups, visitors to science museums). For example, of 87 recently-funded PIs in the ESF Ecosystem Program, all but four elected to address scientifically active audiences such as undergraduate students or natural resource managers for their Broader Impacts. Only very few scientists make creative "leaps" to shift outreach and research collaborations to the scientifically unaware audiences who may have the freshest and most beneficial perspectives for scientists.

Thus, ecosystem ecology – and science in general – must explore new ways to implement and disseminate ecosystem research that will potentially change ways that scientists view society, and the way society views science; and to do so in ways that provide academic rewards.

<u>III. BACKGROUND INFORMATION</u>

III. A. RESULTS OF PRIOR NSF SUPPORT (see References Cited for a full list of citations from these grants)

Ecosystem Research: *DEB 96-15341 (1996-1999): Enhancement and dissemination of long-term datasets on tropical montane forest nutrient dynamics in Monteverde, Costa Rica*; DEB 99-77435 (1999-2003); *Effects of disturbance and global climate change on tropical cloud forest canopy communities: an experimental approach;* DEB 05-42130 (2005-2009): *OPUS: RUI: Ecological Roles of Forest Canopy Communities in a Tropical Montane Forest: Synthesis and Dissemination.* I have received continual NSF support since 1987 to study canopy-dwelling organisms and their roles in ecosystems, including nutrient cycling, productivity, animal/plant interactions, and responses of canopy organisms to human disturbance, which provides me with a strong ecosystem ecology background for the proposed work.

Non-traditional Outreach Efforts: RUI: *The Research Ambassador Program: Empowering scientists to communicate research to public audiences* (ISE 0322214: (2003-2009): I explored new ways to document the values of canopy biota and disseminate them via non-traditional pathways, supported also by a Guggenheim Fellowship (2001) and grants from the National Geographic Society's Conservation Trust

(2001-06). The central concept is to link my research with activities that link to the public's own professions and recreational activities. Partnerships have included church congregations, artists, modern dancers, incarcerated men and women, and urban youth (www.researchambassador.com).

III. B. PILOT RESEARCH AMBASSADOR STUDIES

I elucidate the program by describing four sample pilot RA scenarios:

1. *Moss-in-Prison Project:* In 2004, I became concerned with the ecological problem of non-sustainable harvesting of epiphytic mosses in old-growth forests. My own research demonstrated that epiphytic mosses contribute substantially to ecosystem nutrient capture and retention (Clark et al. 1998), and that they regenerate only very slowly after stripping (Nadkarni et al. 2000, Nadkarni 2001). Moss horticulture, rather than harvesting, seemed the right approach. I engaged prisoners at the Cedar Creek Corrections Center (CCCC) as my partners to develop methods to grow them. I taught them to differentiate four common species; they built a greenhouse and we jointly set up a protocol to maximize and measure growth rates (Nadkarni 2006).

Because of restrictions on equipment and computers, inmates could not dry or weigh samples, nor enter data. But they meticulously recorded observations with pencil and notebook, and created an inexpensive watering system out of local materials. They expressed great enthusiasm with co-inmates and families. After 18 months, we identified the fastest-growing species and the optimal watering regime. This resulted in a peer-reviewed scientific publication with an inmate as first author (Ulrich & Nadkarni 2008); he delivered a talk at the Milwaukee ESA meeting after his release in 2008. A large amount of media attention resulted, including NPR interviews, the NSF website splash page, regional newspapers, and even Russian *Newsweek* (see References Cited). This was supported by an NSF CRPA Grant Supplement to my Ecology grant; and by a grant from the Washington State Dept. of Corrections (DOC, Sustainable Prisons Project, 2008-2010).

2. *Frogs-Behind-Bars Project:* I addressed the conservation issue of biodiversity loss by forging a multiple partnership between The Evergreen State College (TESC), the DOC, the Washington Fish and Wildlife Service, and the U.S. Army, funded by the Sustainable Prisons Project. A herpetologist worked with six zoos and the CCCC to grow the endangered Oregon Spotted Frog (*Rana pretiosa*) from wild-collected eggs to captive-raised adults. These will be released into the wild in protected wetlands of a nearby Army base to augment natural populations. Inmates daily fed and cleaned the frogs' water, and monitored temperature and water quality with a chemical test kit. The CCCC crew had – by far – the lowest frog mortality rate of all the institutions, probably due to the intense attention the inmates brought to the frogs. The herpetologist, zookeepers, and inmates are now co-authoring a protocol for conservationists.

3. *Other in-prison projects*: a) inmates have raised 200,000 prairie plants for restoration of protected prairie areas, in partnership with plant conservationists from The Nature Conservancy; b) an entomologist has created a beekeeping certificate program and bee colony collapse research program for offenders; and c) inmates and prison staff attend a monthly scientific lecture series on a wide range of ecological topics, presented by invited scientists and sustainability practitioners (www.evergreen.edu/greenprisons).

4. *Ecology and Spirituality Sermons*: To raise awareness of the importance of trees and forests to humans, I explored the relationship of trees and spirituality as described in the holy scriptures of the world's major religions. I delivered 23 sermons from the church pulpits of Baptists, Jews, Buddhists, Catholics, Protestants, and interfaith groups. This resulted in two-way communication about the importance of trees, the need for local, regional, and global conservation actions (Nadkarni 2002, 2007).

5. Collaborations with artists: I raise awareness of the importance of forests to arts audiences. For example, I worked with a modern dance choreographer, who created a performance about rainforests called "biome". At performances (in San Francisco, New York City, and San Francisco), I gave a power point on forest ecology; the dancers transmitted the aesthetics of forest biota, and conservation groups presented volunteer opportunities in the lobby. This was supported by grants from the Audubon Society and Toyota Corporation (Hopkin 2007, www.capacitor.org).

What have I learned from these experiences that I can extend to the proposed work?

- Networks link to other networks; i.e., an individual in one non-scientist audience would refer me to other non-scientist audiences (e.g., member of a congregation invited me to speak at a hospital);

- Non-scientists have well-developed networks based on their own interests and values, and can link a scientist into those networks (e.g., prison officials introduced me to other prison officials);
- Individuals from one non-scientist group directly influenced individuals in other groups in a "leap-frog" action (e.g., rap singer influenced graffiti artists to create canopy artwork that spoke to urban youth);
- Non-scientists generated observations and questions that were novel and useful to me, because of their fresh perspective (e.g., dancers' questions about nutrient distribution elicited a new piece of nitrogen cycling research);
- Non-traditional partnerships attract large amounts of positive media attention which is viewed well by the public, academic administrators, and often informs other scientists of research projects;
- Non-scientists are as passionate about their own interests as scientists are about scientific interests, and if I can link the two, then there is a powerful potential for education in both directions.

These pilot projects also revealed eight potential <u>benefits for scientists</u>: a) generation of new ideas and fresh insights; b) assistance with portions of research project that results in peer-reviewed publications and talks; c) positive media attention that brings awareness of potential collaborators and university administrators; d) increased space, "hands" to carry out basic assistance, and new sources of funding; e) a more informed public audience; f) inspiration for Earth's stewardship and motivation for conservation actions; g) positive modeling for students; h) a sense of personal fulfillment; and i) contribution to shift the view that scientists are isolated from society.

They pose five <u>challenges for scientists</u>: a) exposure to unfamiliar settings; b) undertaking of new roles, with limited existing guidance; c) skepticism among peers; d) limited immediate academic gains; e) lack of familiarity with approaches to measuring effectiveness of dissemination activities.

Thus, although past work demonstrates great promise for this approach, challenges exist that demand investigation before broadly applying this approach to ecosystem science.

<u>IV. PROPOSED RESEARCH</u>

I use the metaphor of an *ambassador* to model the proposed ecologists' interactions with public audiences. Ambassadors are diplomatic officials of the highest rank who represent their sovereign nation. They convey information about their home country, but also gather information from the foreign country to bring back home, thus enriching both states and the world at large. They require training in language and culture, and can choose from a range of "foreignness" in the countries they serve. Analogously, "Research Ambassadors" (RAs) visit other "countries" – (non-scientific public audiences) – to exchange information and enrich both science and the public. They, too, need training and can choose from a wide variety of audiences.

Building upon past work (Sect. 111.B), our team will critically and quantitatively examine potential benefits and challenges to create sustainable models for ecosystem ecologists, and ultimately, other scientists. My approach is to recruit, train, and evaluate a cadre of RAs, ecosystem ecologists who will emphasize "scientifically unaware" segments of the population (Gregory and Miller 1998), especially "captive" audiences, those that have little or no access to science because of physical, cultural, or legal barriers (e.g., people in assisted living centers, urban youth, incarcerated men and women) (Nadkarni 2004, Ulrich and Nadkarni 2009). Many of these have a disproportionately high number of underserved ethnic and racial groups (Maguire and Pastore 2001).

The Research Ambassador Program integrates certain aspects of contemporary science outreach programs described in Section II, but differs because RAs: a) emphasize two-way exchange, rather than one-way information exchange; b) implement rather than merely disseminate research; c) target non-traditional and underserved or captive audiences, and d) interact in-person rather than impersonally (e.g., science museums exhibits). Most importantly, the emphasis is on making creative leaps to connect with public audiences in unprecedented ways. **Thus, this project embraces a major departure from both traditional ecosystem research and traditional informal science education activities, rendering this a high-risk but potentially high-return proposal.**

IV. A. PROJECT ACTIVITIES

There are six steps of this project, from recruitment of RAs to dissemination of their results.

IV.A.1. RECRUIT RAs

We will recruit ca. 50 RAs, with a balance of early- and late-career scientists. Young scientists tend to be more receptive to creative outreach than their older counterparts, but they have tighter career obligations. Late-career scientists, in contrast, who have less concern with grant-getting and publications, often perceive that outreach contributes to their legacies. Their participation can serve as a model and will "give permission" to junior scientists. We will draw candidates from three pools:

a) Current and recent PIs of NSF Ecosystem projects whose Broader Impact Statements indicate a need for wider reach and whose research topics can engage non-scientific public partners;

b) Ecologists alerted through our announcements on the ECOLOG listserve and ESA Bulletin; and

c) Professional contacts from my 26 year career in ecosystem ecology; recommendations from those contacts; and those who learn about this through project websites (see References Cited).

IV.A.2. Profile RAs and Brainstorm Outreach Venues and Strategies

Our Evaluation Consultant will develop "readiness and matching assessments" to evaluate the types of audiences that are appropriate (and inappropriate) for an individual RA. This process will identify the researcher's interests, hobbies, and personal characteristics (e.g., an aging parent) to facilitate links with potential audience groups (e.g., senior citizens). This will also apprise the team of the time available for participation, past experience in outreach, and the nature of the RAs research projects.

We will encourge our RAs to be creative and courageous in the choice of their audiences, seeking an array of potential audiences to accommodate the comfort levels of RAs, especially those new to outreach. We offer three venues to brainstorm links: i) individual or small group workshops at TESC to draw on existing projects and contacts (e.g., within 50 km of TESC, we have ongoing projects in 4 prisons, 6 churches, and an assisted living center); ii) full-day workshops at the annual meeting of the ESA (2010 and 2011); and iii) "housecalls"; RA Program staff travel to the RA's home institution to reduce time costs. Our team will visit the lab and/or field site of the RA to document the questions and results of the research projects; record on the researcher describe his/her research; and brainstorm local links for collaborations.

Examples of such brainstorming sessions include:

a) A researcher who studies nitrogen budgets can speak to a group of bankers, who are concerned with pools and flows of money in their monetary budgets. They might find shared interests in the spreadsheet formulae they have developed to calculate whole ecosystem (or whole bank) budgets.

b) An ecologist who studies riparian ecosystems might give a sermon on the portrayal of rivers in holy scriptures to church congregations by identifying references to rivers in the Bible, which she can relate to the ecological importance of rivers as connectors in landscapes.

c) Other matchings for RAs and public partners include: bird ecologists and truck drivers (both interested in migration patterns [of birds or trucks]); hydrologists and plumbers (both interested in water flow through systems [urban landscapes or urban structures]); disturbance ecologists and house cleaners (both interested in recovery from disturbance events [landscapes or household]).

IV.A.3. Guide and Assist Scientists in Communication

It is critical to inform RAs of the potentially different "culture", educational levels, areas of interest, and appropriate media to communicate, using models from the media training modules of the Aldo Leopold Leadership Program (http://leopoldleadership.stanford.edu/). Our team will focus on helping each scientist create engaging, well-illustrated talks for the public. If a scientist requires images, our team will help procure these. We will review the talks before they are delivered for the first time. They will be videotaped by a member of the RA lab for distribution via the RA's and our own website.

IV.A.4. Ecosystem Research Communication and Implementation

Based on the results of the brainstorming, our team will help the RAs make contact with local, regional, or national groups to whom they can communicate. Our approach is to look up (on the web or phone book) relevant professional organizations (e.g., American Banking Association (www.aba.com); International Executive Housekeepers Association (http://www.ieha.org/), hobby groups (Seattle Woodworkers Club), civic groups (Lion's Clubs), or religious congregations (Unitarian Universalist Churches). Based on my past experiences, it is remarkably easy to make an introductory call or send an email to explore the possibilities of providing a lecture, seminar, or sermon.

Some RAs (we estimate ca. 30%) will wish to involve the public partners in the process of research, so our team will assist in parsing out the portion(s) of his/her research that are tractable for the relevant groups. For example, in the moss horticulture project described in Section II.B.1, prisoners could separate and water mosses, but did not have access to a computer to deal with data. An ecosystem ecologist who studies how soil processes shift under conditions of anthropogenic nitrogen saturation might partner with senior citizens who are isolated in assisted living centers to carry out a set microcosm experiments that could be located on a wheelchair-accessible enclosed porch for daily watering and recording of microcosm soil temperatures by the residents.

IV.A.5. Evaluate Effects on Scientists and Public Partners

David Heil & Associates, Inc. (DHA) will partner with TESC to provide on-going evaluation for the RA program, using a participatory evaluation approach, in which the evaluator serves as facilitator for a process largely driven by the project stakeholders to both harness the experiences of the RAs and tailor data collection activities to meet the information needs of the stakeholders. This will provide a foundation to include other stakeholders (e.g., public audience representatives) as the RA program grows.

The evaluator will attend two RA meetings each year to facilitate discussions to inform the design of the evaluation and the interpretation of evaluation findings. During the first meeting, the evaluator will facilitate a session to develop a logic model for the RA program. A logic model is a diagram that depicts a program's theory of action by outlining program activities and showing how they link to the anticipated outcomes for the project. This logic model for the RA program will outline the components of the program and anticipated outcomes for RAs (primary audience) and public audience members who attend outreach events (secondary audience). It will reflect ideas of both the participating RAs and program staff and will serve as a framework for the evaluation.

<u>Evaluation Questions</u>**:** Although both the formative and summative evaluation questions will ultimately be derived from the program logic model, the project will focus on examining how ecosystem researchers can be meaningfully engaged in public outreach and benefit from providing this outreach. *Formative Evaluation Questions.* What strategies are effective for recruiting and retaining scientists to participate as RAs? What factors are important to consider when matching an RA to an outreach setting? What preparation and guidance do RAs need to support and sustain their outreach efforts? *Summative Evaluation Questions.* Does participation as an RA change how scientists view their work? Does participation as an RA change scientists perceptions of the public audiences with which they work?

<u>Data Collection Methods:</u> The evaluation methods include both quantitative and qualitative data collection approaches, but will rely more heavily on the former. All data collection activities will address the formative and summative evaluation questions for the project and will reflect the perspectives of key stakeholders in the project (e.g. RAs, outreach venue organizations, and public partners).

<u>Community Stakeholder Interviews</u>**:** In both years, DHA will conduct semi-structured telephone interviews with public partners. DHA will draw a sample of 10 from the list of potential partners to interview. The interview guide will be designed to address the formative evaluation questions that are derived from the logic model that is developed at the opening RA meeting. <u>RA Interviews</u>**:** In both years, DHA will conduct semi-structured telephone interviews with RAs. The interview guide will be designed to address both the formative and summative evaluation questions derived from the program logic model, and will be modified as necessary.

<u>Research Ambassador Post-Event Debrief Form</u>**:** DHA will develop a brief data collection form to support documentation of RA outreach experiences. In addition to providing process data to describe the

services delivered through the outreach program, this data collection form will provide an opportunity for RAs to quickly document their initial reactions to their outreach experiences.

Post-Event Public Audience Feedback Forms: DHA will develop a brief Post-Event public audience feedback form for distribution at outreach events. This data collection tool will include a set of quantitative items designed to measure the core public audience outcomes (identified in the logic model) and open-ended items to provide qualitative data related to the goals that are unique to each outreach event.

IV.A.6. DISSEMINATE RESULTS

Each RA will be encouraged to give talks and/or publish ecosystem research work that was done in collaboration with his/her public partners. Our team will assist with garnering attention from the media, for which we have considerable experience and contacts from previous RA work (see References Cited). This will alert academic and lay audiences to research activities and results.

For each RA, our team will set up a website either on the RA's server, or on a central RA Program website that we establish at the beginning of the project. If the scientist already has a website (probably oriented towards other scientists), we will help augment it so that it also presents a public-friendly interface, which should be graphically pleasing to non-scientists and easy to negotiate. Our websites will be linked to others as appropriate (e.g., International Society of Arboriculture, Washington State Department of Corrections, Alternatives to Violence Project, North American Urban Forestry Commission, American Banking Association). We anticipate that this process will lead to successful recruitment of other RAs, and feed into an organic expansion of the program.

In total, RAs will commit to performing the following activities: a) respond to an interview and/or lab tour to determine current obstacles to dissemination to the public [2-6 hr]; b) practice and deliver at least two talks to selected public audience [4-8 hr]; c) If appropriate, implement portion of a hands-on research project [20-200 hr]; d) if appropriate, participate in media communication; e) attempt to recruit at least three colleagues to the RA program [2-4 hr]; f) participate in formative and summative evaluations.

V. ANTICIPATED RESULTS AND PRODUCTS FOR INTELLECTUAL MERIT

Increasingly, ecologists and other researchers are being asked to provide outreach to public audiences, but have been provided with almost no guidance or rewards to do so. This project will create a model to successfully connect ecologists to underserved public audiences by determining the amount and type of guidance necessary to support these efforts. Our results will inform outreach efforts by researchers across the field of ecology and in other scientific fields, which is a significant step in shifting the ways ecology – and science – are both served and viewed by society.

Specifically, each RA will be provided with the following: a) academic recognition via an approving letter from a well-respected figure (e.g., Chair of RA's Department) for his/her file; b) an honorarium; up to $1000; c) contacts of public partner organizations to reduce "overhead time" for RAs; d) videos of model presentations to hone vocabulary and conceptual levels; e) evaluation instruments and feedback to assess the RA's efforts.

How will these benefit our participating ecosystem scientists?

a) Fresh perspectives for research from novice audiences;

b) Contribution to research support, including space, free or inexpensive assistance with research tasks, equipment, and funding not otherwise available through typical academic channels;

c) Greater exposure of work by broadening of the audience base of the RA's own public-friendly website and the Research Ambassador Program website;

d) Potential for high-profile media attention due to the unusual "hook" of associating with public audiences that seem to be strange bedfellows; this can result in positive assessment by academic administrators, the general public, and other scientists.

e) A profound sense of fulfillment in making apparently obscure research interesting and relevant to other people.

VI. BROADER IMPACTS OF PROPOSED WORK

Through contact with RAs, outcomes for the ISE community and the public will provide

a) A more informed citizenry with access to the ideas of ecosystem science, due to publications, interactions, and websites we create;

b) Recruitment of other scientists as the program expands;

c) A paper that summarize the attitudes of scientists before and after participation in a peer reviewed academic publication for the ISE community (e.g., *Public Understanding of Science*);

d) A tested model to significantly shift society's perception of roles and accessibility of scientists.

VII. CONCLUSIONS

Current times are characterized by rapidly worsening environmental problems. Ecologists are increasingly presented with issues that demand understanding and involvement by the public. The innovative approach proposed here -- to help ecosystem ecologists engage with non-traditional public audiences to implement and disseminate research -- holds promise for high scientific payoffs for, individual researchers and for the ecological community, and science at large.

The proposed activities will produce models of creative public engagement that are soundly evaluated and documented in terms of benefits and challenges aimed directly to ecosystem ecologists. If this work is successful, our results will significantly expand images and actions of our research community from its current restricted scope of working pristine field sites and cloistered laboratories toward practicing ecosystem ecology in nearly any venue of human endeavor. This high-risk project will be especially critical for the next generation of ecosystem scientists, as it can profoundly shift the relationships between science and society, and between humans and nature.

VIII. TIMELINE

Jan. 2010	Hire staff; recruit RAs, establish website, do formative evaluations
Sept. 2010	Visit RA labs, generate contacts for RAs, create websites
Nov.2010-Aug. 2011	Partner with public audiences on research projects, RAs implement talks, generate research and outreach papers
Sept.– Dec. 2011	Modify websites, do summative evaluations, generate recommendations, exit interviews, prepare for next stage of program development