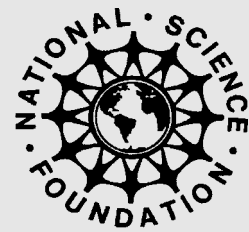


**Citizen Science
Toolkit Conference**

June 20 - 23, 2007

introduction and overview



**CORNELL LAB of
ORNITHOLOGY**

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607.254.BIRD telephone
www.birds.cornell.edu

159 Sapsucker Woods Road
Ithaca, New York 14850

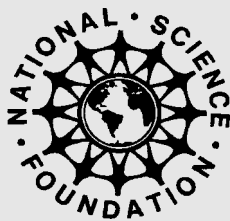
These opening remarks took place at the start of the Citizen Science Toolkit Conference, held at the Cornell Lab of Ornithology in Ithaca, New York on June 20-23, 2007.

This documentation did not originate as formal papers or presentations, rather it reflects the informal, idiosyncratic nature of oral remarks at a live event.

Documentation of the conference is meant to serve as a resource for those who attended and for others in the field. It does not necessarily reflect the views of the Cornell Lab of Ornithology or individual symposium participants.

For complete documentation of conference proceedings and to learn more about citizen science and the Citizen Science Toolkit, or to join the ongoing citizen science community, go to:

<http://www.citizenscience.org>



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Cover photo and above: Conference participants go on a worm walk with Cindy Hale, Program Director of Great Lakes Worm Watch. The worm hunt continues on pages two and three.

Opening Remarks

Welcome

John W. Fitzpatrick,
Executive Director,
Cornell Lab of Ornithology

It's exciting for me to stand in front of a group this distinguished, this exciting, this creative, and this varying, coming from all of the different projects and places represented. Seeing you here at the Lab is a tremendously meaningful moment for me as well as for Rick Bonney, Janis Dickinson, and the other members of the citizen science community here. In the 1990s when this was just beginning, the idea that by the year 2007 so much could be underway in citizen science would have been more than a dream come true for many of us at the Lab.

I do recall a point early in my time here and well into Rick's time here. We were writing a grant proposal and looking around in the literature for the phrase "citizen science" and couldn't find it. That was in the mid '90s. By now, as everyone in this room knows, it is becoming a household term. You are all engaged in that process and it is a source of enormous pride and gratification to us here that it is where it is now, and you are where you are now.

The Lab of Ornithology is a place that has existed in concept, so to speak, for almost a hundred years. Arthur Allen began engaging citizens and thinking about birds way back early in his career at Cornell. He actually had a little sign on his door that said "Laboratory of Ornithology" to distinguish him from all of the bug people he was surrounded by. The garage building that many of you know that was next door here was built in the '50s and we moved into this current building in 2003, and the concept of engaging citizens and doing real world science has been a hallmark of the Lab of Ornithology for many decades.

It was really impressive when I looked through the project Web site (and did as good a job as I could of whipping through all fifty of your bios and project descriptions) to see the range of projects now underway and the potential that those projects have for doing real stuff. I would particularly like to commend those involved for phrasing the mission statement of this project

What We Mean by "Citizen Science"

The following is our conceptual understanding and application of this term for the purposes of the Citizen Science Toolkit Project.

The term "citizen science" has been used to describe a range of ideas, from a philosophy of public engagement in scientific discourse to the work of scientists driven by a social conscience.

In North America, citizen science typically refers to research collaborations between scientists and volunteers, particularly (but not exclusively) to expand opportunities for scientific data collection and to provide access to scientific information for community members.

For the purposes of the initiative, we define citizen science as:

**projects in which volunteers
partner with scientists to answer
real-world questions.**

as succinctly and as powerfully as you have: “projects in which volunteers partner with scientists to answer real-world questions.” Every one of those words defines something really important: the fact that these are organized projects, that they use volunteers distributed across the landscape, that scientists are engaged in them, that you’re answering questions, and that those questions are in the real world. What a great enterprise! I think it’s a growth industry. I don’t want to take any more of your time this morning, but did want to express that. We carefully chose “citizen science” to be two of the seventeen words in our own mission statement here at the Lab of Ornithology. I couldn’t be more thrilled than to have you all here at this meeting and I hope it is the first of many in which we put our collective heads together. Some of the best in the country are gathered here to address the challenge of making it easy for everybody in the world to participate in this.



Shared Values

Janis Dickinson,
Director of Citizen Science,
Cornell Lab of Ornithology

I want to share my impressions from the introductory slides that participants shared during the opening reception for this conference, and thank all of you for giving your time in the next few days for this collective effort to develop some guidelines for doing citizen science in the form of a toolkit. It is a form of altruism, and that is what I wanted to talk about based on my impressions during your introductions.

We are not just a group of individuals coming from a diversity of disciplines to do truly ground-breaking, interesting, and interdisciplinary work. We are apparently a group with shared values, and one of those values is great respect for and awe of the natural world, whether we're talking about birds or worms or stars.

The other major value is education and the idea that education has many forms, only a few of which are represented in the school systems, that it is a lifelong process, and is incredibly important in empowering people to deal with real problems.

The third is that essentially we all believe that the cumulative acts of many represent a powerful vehicle for change. I think that's also incredibly important in today's world.

I would like to introduce the co-convenor of this gathering. "The nation's first professor in citizen science" is how I like to refer to Janis, and how she was described in *Science* magazine. Janis came to us about eighteen months ago from Berkeley. She has been long engaged in behavioral ecology, and over the recent part of her career has been working on a number of projects in coastal California, engaging citizens. She is a tremendous influence here at the Lab of Ornithology as the Director of Citizen Science. - John W. Fitzpatrick



Developing a Citizen Science Toolkit

Rick Bonney,
Director of Program
Development
and Evaluation,
Cornell Lab of Ornithology

I would like to introduce Rick Bonney. I have great appreciation of Rick's talents. Rick has been instrumental in developing the citizen science programs here and has indeed written most of the grant proposals that funded the projects that I now direct. He has been at the Lab for more than half of his life. He came to Cornell as an undergraduate and went away for a few years, but he returned and he has stuck ever since and we're glad he did.

- Janis Dickinson

Citizen Science and Critical Thinking Skills

Why are we all here? Last year when I was in Provincetown I saw a T-shirt that said, "We are all here because we are not there." That's one answer. Another answer has to do with my father, who was one of those very annoying people who usually would not answer my direct questions. How many people had a parent or a mentor like that? For example, if the question was, "How does the sink work?" his response would be, "Well, let's figure it out." He always did that. He always wanted me and my sisters to engage in critical thinking.

When I look around the world I think to myself, there are an awful lot of people who do not engage in critical thinking. There are a lot of ways to teach critical thinking skills and there are lots of books written on teaching critical thinking skills, but over the past hundred years or so, science education has become a stand-in for teaching about critical thinking because if you can teach people about the process of science, you can help them understand how to think critically. And citizen

science is a form of science education that can be very helpful in teaching critical thinking skills.

I originally came to Cornell in 1972 because of the Lab of Ornithology, at least partly. I grew up listening to the Peterson tapes of bird sounds, and I knew they came from the Lab. After I was accepted to Cornell my dad brought me to Ithaca to see what I was getting into. The first place we visited was the Lab of Ornithology. This room we are in, the Fuertes Room, is the only thing that has been preserved from the old building, other than the view. I walked into the Fuertes Room and said, "Dad, I am never leaving this place." And I never really did.

About the "Cornell Lab of Ornithology Model" of Citizen Science

In our conference materials we have outlined ten steps for developing and implementing a citizen science program, which some people have been calling the "Cornell Model." If, right this minute, I were faced with the task of gathering up all the information I could find on citizen science and putting it on a Web site for people to read, that is the model I would use. It might be a good idea, it might be a terrible idea. What I am hoping will happen for the rest of this conference is that the discussions will inform the approach that we will take for getting this information on a Web site so that people can use it. If we end up with that model, okay; if we end up with a different model, that's okay too. It's a starting point, a straw person so to speak. - Rick Bonney

"CLO Model" (aka "steps") for Citizen Science

1. Determine audience/Choose scientific questions
2. Develop scientist/educator/technologist/evaluator team
3. Develop, test, and refine protocols and data forums
4. Recruit participants
5. Train participants
6. Accept, edit, and display data
7. Analyze and interpret data
8. Publish results
9. Apply results
10. Measure effects

I started working at the Lab full time in 1983 and was always intrigued by the Lab's desire to integrate amateurs into the study of ornithology, which started with our founder, Arthur A. Allen, in 1915. Without getting into a full-blown history, I will say that we started our nest record card program in 1965, and Project FeederWatch in 1987. As a result, the Lab is sometimes credited with inventing citizen science. In truth that is ridiculous. Citizen science has been around for as long as people have been studying nature and thinking with curiosity about the world around them. Even organized citizen science really didn't start here. The Audubon Society's Christmas Bird Count started in 1900, and I would bet that there are other projects that started even before that time.

What we did do at the Lab of Ornithology was learn how to write successful citizen science proposals for the National Science Foundation. As a result of that we have had some generous funding over the years, and developed many citizen science projects for different audiences. After we started taking FeederWatch to scale in the late 1980s, I began hearing from participants about what they were learning. I would hear things like, "I've been watching the birds at my feeder for twenty years, but I never really saw what they were doing until I had to count them for FeederWatch." You've all heard that kind of stuff. I could go on and on and on about how the experience of collecting data, thinking about questions, and observing really helped learning to happen. It's hard to document, but we know that it has happened.

So, one of the reasons that I am so taken by the citizen science concept is that I believe that by taking people through the entire scientific enterprise, where they think of their own questions and then use their own data to answer those questions, we can help people all around the country and all around the world develop more critical thinking skills. I have never thought of citizen scientists as just citizen data collectors. I realize that in many projects that is what most participants are, but I really would like to see more or even most projects take people all the way through the scientific process from beginning to end.

The Need for "Citizen Science Central"

Our success in getting funding to develop citizen science projects also has resulted in a lot of phone calls from people asking how we develop and fund citizen science and how could we help them do it too. I love those calls, especially when they include invitations to places like Puerto Rico

www.citizenscience.org



in February, but I started thinking there has to be a more efficient way to help the field grow. Not only that, there are an awful lot of people doing citizen science who are not writing NSF proposals. They are working with other agencies, working with the government, working with schools. There is so much accumulating knowledge about involving the public in science. Has anybody tried Googling “citizen science” lately? You can’t possibly look at all of the listings that are there.

About two years ago we started thinking, how can we begin to aggregate or accumulate this growing wisdom to help all of the people who are trying to start new projects or improve the projects they are already doing; to implement projects; and to evaluate their scientific and educational impact? We thought, well, we need to get everybody together to pool their wisdom. So we wrote another NSF grant—and here we all are, a couple of years later.

Now, the fifty or so people who are here are just a small fraction of the number of people who wanted to be here. I really look forward to figuring out how we can reach out to that greater community with the Web site, with virtual Webcasts, with online conferences, or with whatever it is we decide to do as a group over the next few days.

What I really want to develop is a central location that people can come to when they want to start a project or a group of projects, or get tools for cyberinfrastructure or tools for evaluation, that represents the best thinking of this whole community—everybody in this room, all of the people who applied for this conference who couldn’t come, and all of their connections also.



We did this kind of gathering once before and it really had some success. About two years ago we got funding from NSF to hold a conference called Web Designs for Interactive Learning. That conference, I know for a fact, changed lives. We were talking there about Web 2.0 and nobody even called it that, we were almost inventing it. Some of the people at that conference have gone on to form partnerships, to write successful proposals, and to build new projects as a result of the networking that took place at the conference.

www.wdil.org

In addition to printed proceedings from that conference, we also created a Web site, Web Designs for Interactive Learning, which is a community-built site that allows people to come in and put up a Web site that they’re working on and get comments. There are all types of resources and reusables. It takes you into code that you can reuse or borrow for your own project. So you get the idea—we were starting to develop a community out of that project.

This is what I really want to do again to create a Citizen Science Central Web site. Probably everybody here has had a chance to look at our early draft. You are all on it, your bios and abstracts are listed under the conference heading. If you click on the Project Gateway, one of the things you will see is a database of all the citizen science projects that we know of. People who just want to know what projects already exist in their area geographically or taxonomically or procedurally or conceptually can go to the Gateway and get that information. We are collecting those data through an online survey and we were up to over 200 projects the last time we looked. If yours isn't in there, please enter your information.

We are also going to have a Reference database with hundreds of references that we have collected here at the Lab and from all of you so that people can find citizen science related references all in one place.



Along with that we will have the Toolkit. My dream for this Toolkit is a place where you come when you want to know: How do I do it? I've heard of citizen science—how do I get started?

I don't really know yet what the format for this Toolkit is going to be. I hope that by the end of this workshop we'll have an inkling. Maybe it's a dichotomous key, maybe it starts out with a question about what it is that you're trying to do—I'm not really sure. What I do know is that I would like people to be able to go through the Toolkit, click on different links and get examples, Web sites, projects, and references that will help them put together their own projects or improve their project if they've already got one going. Or maybe they'll decide, I don't really want to build a project, it looks too hard. What I really want to do is partner with somebody who is already doing this. And then they could go look in the Project Gateway section for a partner.

Home

About Citizen Science Central

Conference

Project Gateway

References

Toolkit

Discussion Forum

If you currently administer a citizen science project in North America and would like to be included in our database, enter the information about your project at:



www.citizenscience.org/projects

When we talk about citizen science, what are we talking about? Are we all talking about the same thing? Are we talking about different parts of the same thing? Personally I think we are all talking about the same thing, approaching the elements from different points of view. - Rick Bonney

The Conference Process

In order to build this Toolkit, we need information. You guys have all the information. The questions that we have posed for you in the working groups* represent our best thinking on the questions we need to answer to create the Toolkit. At least it was our best thinking as of yesterday. We probably could do a little better now. That is why we gave you those questions, but we also know that they can be answered in different ways. You're going to come up with different outcomes and different measures and different approaches if you're really research oriented than you will if you are an evaluation expert or a technologist. We wanted each group to answer the same set of questions, but in their own way. When this is over, we will compile that information into some logical assemblage, maybe a matrix, that can go into the Toolkit, so we really want you to try your best to focus on answering the questions.

Some of you have said you want to answer different questions. We don't

mind if you identify and answer different questions as long as you generate information that is going to help inform the Toolkit. I do hope that you will produce annotated outlines with bullet answers to whatever questions you choose. We are going to pop those outlines right up onto the Web site and they might include, for example: lists of outcomes, lists of measures, Web sites where we can find tools that will help us measure those things, and lists of topics that you think would be really great for citizen science that haven't been done yet. For example, we all know that it's easier to do a project in which you're counting something rather than one in which you're measuring behavior. It's possible to have citizen scientists measure behavior, but it's harder. Those kinds of tips need to be in the Toolkit.

Project Advisors

I want to take time to make a couple of acknowledgments. Most if not all National Science Foundation projects have advisory boards, which include people who work pretty hard to help the project staff put something together and pull it off. We have one for this group, and I would like to recognize those people because we really appreciate their help:

- Larry DeBuhr
Vice President of Academic Affairs, Chicago Botanic Garden
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- Maureen McConnell
Senior Exhibit Developer, Boston Museum of Science
- William Michener
Associate Director, LTER Network Office, NEON, University of New Mexico
- Karen Oberhauser
Professor of Fisheries, Wildlife and Conservation Biology, Monarch Larva Monitoring Project, University of Minnesota
- Fernando Silva
Former Head of Development and Planning, Conservation Trust, Puerto Rico

Bill Michener was unable to attend this workshop because of scheduling difficulties, and Fernando Silva is another person who was unable to make it but gave us a lot of help back in the early stages of the project. I want to thank them and all of the advisors here who helped us pull this off. - Rick Bonney