Next Steps

Engaging and Learning for Conservation Workshop on Public Participation in Scientific Research

American Museum of Natural History
April 7-8, 2011
This document is intended to be a faithful synthesis of presentations and discussions at the Engaging and Learning for Conservation Workshop on Public Participation in Scientific Research, held at the American Museum of Natural History on April 7 & 8, 2011. It is meant to serve as a resource for those who attended, for funders, and for others in the field. It does not necessarily reflect the views of the American Museum of Natural History, the Cornell Lab of Ornithology, the National Audubon Society, or individual meeting participants. Participant comments have been paraphrased and the sequence of participant remarks has been reorganized. These are not exact quotes, rather they are an attempt to capture the content and meaning of the ideas presented.

Contents

Where Do We Go From Here? .................... 1
Introduction ............................................. 1
Overview of Five Topics ............................. 1
Action Steps Report-outs .......................... 5
Building an Association for PPSR ................. 5
Next Steps for the Citizenscience.org Website..... 7
A PPSR and Conservation Module for Tools of Engagement ................................. 8
What Is DEVISE and How Can Participants Get Involved? ........................................ 9
Best Practices for Data Management for PPSR Projects .......................................... 10

Closing Remarks ....................................... 13

Document Series

This is one of a series of documents about this workshop available as PDF downloads on the workshop website. The series includes:
I. Setting the Stage
II. Challenges and Opportunities
III. Putting Strategies into Practice
IV. Next Steps

Workshop Web Site
http://citizenscience.org/conference/ ppsr2011

This workshop was funded by the National Science Foundation under grant DRL-1020909. Any opinions, findings, conclusions or recommendations expressed in this material are those of workshop participants and do not necessarily reflect the views of the National Science Foundation.
Where Do We Go From Here?

Introduction

Judy Braus, Project Co-Principal Investigator
Senior Vice President for Education and Centers,
National Audubon Society

In this final session we are going to focus on five projects. These projects represent some of the next steps for PPSR and conservation, but there will be many other next steps in addition to these as the field develops. We will begin by hearing from those who will be conducting these five breakout groups.

Overview of Five Topics

BUILDING AN ASSOCIATION FOR PPSR

Rick Bonney, Project Co-Principal Investigator
Director, Program Development and Evaluation,
Cornell Lab of Ornithology

This is the second time we have done an NSF-funded conference on the field of PPSR. The first time we had 135 applicants for about 35 open seats, and disappointed about a hundred people. This time we had about 200 applications for about 25 seats and disappointed about 175 people. I’m not going to do this anymore. I really want to move forward with an organization for this field that is wide open and inclusive and will start out with “deep hanging out” and such.

In fact, with Abe Miller-Rushing’s help, we are going to have a conference at the 2012 ESA meeting, which is going to be held in Portland, Oregon. Toward that end I have wondered whether it is time for an association that people could join that would do things like publish a peer-reviewed online journal for best practices in PPSR, take ownership and manage the citizenscience.org website, and set up regional training centers for mentorship and hand-holding to build new projects. You get the idea. Anyone interested in this proposed association or in becoming the nonpaid editor of the journal, come and talk to me about what is involved.

NEXT STEPS FOR THE CITIZENSCIENCE.ORG WEBSITE

Jennifer Shirk, Web Content Support
Project Leader, citizenscience.org,
Department of Program Development and Evaluation,
Cornell Lab of Ornithology

The focus here is on the citizenscience.org website as one delivery mechanism for the great information that is being crafted in this workshop. What might we make that look like? This is a really good time to have this conversation because we are about to embark on moving everything out of the old structure of the website and into a brand new one. The new one looks like something you’ve already seen, the discussion forums for this workshop,

Next-Step Breakout Sessions

Participants could elect to participate in two of five different breakout groups during the course of this session. In each breakout group, participants learn more about next steps for PPSR and conservation and how they can be involved in these next steps.

Five Topics

- Building an Association for PPSR
  Rick Bonney

- Next Steps for the Citizenscience.org Website
  Jennifer Shirk

- A PPSR and Conservation Module for Tools of Engagement
  Judy Braus and Robert Petty

- What Is DEVISE and How Can Participants Get Involved?
  Tina Phillips and Alycia Crall

- Best Practices for Data Management for PPSR Projects
  Jake Weltzin and Andrea Wiggins
Jennifer Shirk talks about citizenscience.org

Mandatory PPSR

Listening to all of the presentations in the last session, I had an idea. How about if we can get an amendment into the federal budget negotiations that all students will participate in a PPSR project before graduating from high school? What do you think? * Rick Bonney

but it doesn’t ultimately have to look like that. We can completely rethink and redo everything. The citizenscience.org website Toolkit is designed around what we have been calling the steps, but those may not be steps, they may be a cycle or whatever. We have the opportunity in this conversation to reflect that in the new design of the website.

I thought what we would be talking about was how to revise the steps to reform the website, but that conversation has already happened. Other things we can talk about in addition to that might be how to capitalize on the momentum that came out of the online discussion forums; ways to build a bigger, better reference database of materials by or about PPSR projects; and even what to rename this website if that becomes an issue—if this is not just “citizen science” anymore, what is it?

A PPSR AND CONSERVATION MODULE FOR TOOLS OF ENGAGEMENT

Robert Petty, Lead Advisor
Director of Field Support (Western States), National Audubon Society

As you know, Judy Braus has been the leader of this project. The Tools of Engagement manual has just come out and it is really going to revolutionize the way all of us do conservation education and incorporate social engagement strategies in that realm. Tools of Engagement has several modules that are in the process of being developed, including one on diversity, one on research, and one on storytelling, and there is going to be one on public participation in scientific research.

This is your opportunity to be a coauthor in that supplement of this great publication, and your ideas are going to be revolutionary in how we create that new supplement.

WHAT IS DEVISE AND HOW CAN PARTICIPANTS GET INVOLVED?

Tina Phillips
Evaluation Program Manager, Department of Program Development and Evaluation, Cornell Lab of Ornithology

We have the longest name—Developing, Validating, and Implementing Situated Evaluation Instruments for Informal Science Education to assess the impacts of PPSR—or DEVISE. Basically what we are trying to do is move the field forward in the effort to evaluate on a similar plane. People are doing things in very different, haphazard ways, but we all sort of follow a similar logic model. If we all agree that most projects operate within this logic model, then we can certainly agree that there are similar ways to measure individual learning outcomes and project-wide impacts. The end goal is to be able to do this on a cross-programmatic scale so that we can show funders, policy makers, and decision makers that in totality and collectively our projects are making a difference and are therefore worth sustaining, worth fighting for, and worth funding.

What I would like to do is first give you a brief
overview of the PPSR report, for those of you who have not read it (*Public Participation in Scientific Research: Defining the Field and Assessing Its Potential for Informal Science Education*, A CAISE Inquiry Group Report, July 2009). There are some good nuggets and tidbits there in that meta-analysis in terms of what we found people are learning and getting out of PPSR. I would also like to give a brief overview of the state of evaluation in PPSR projects. We conducted a survey through the citizen science.org listserv and had about 200 project respondents. There are only about 120 projects listed on that site, so I think we got a good response rate from the projects that are there. There are some interesting things we found out about the projects and how they are managing evaluation.

I also want to give people an opportunity to be part of DEVISE, and there are five or six things I would like to introduce in this work group that you can help with. One is, I am trying to collect the goals, objectives, and indicators amongst the different projects. You don’t have to submit those now, but I want that representation in DEVISE and it would be helpful if you send those to me for each project you are involved in.

I have also created a users’ guide to evaluation for non-evaluators. It is meant to be a plug-and-play tool that nonevaluators can use, and I would love comments and feedback on that. Also, if you have used assessment tools that you have found to work or not work, I would like to know that information.

If you would like to review existing surveys or instruments, there is an opportunity for that in DEVISE as well. We need to be able to show people what tool might work, if it has been used, and in what capacity, and how well it worked for people. Also, if you would like to help test new or modified evaluation instruments in your project, we would love for you to do that with us. Then you may want to help with the validation and even data analysis of some of the information we are going to get back through DEVISE.

There are lots of ways to help and I have sign-up sheets, so even if you can’t attend this session you may want to stop by and sign up for one of these activities.

**BEST PRACTICES FOR DATA MANAGEMENT FOR PPSR PROJECTS**

Jake Weltzin  
Executive Director, USA National Phenology Network, USGS

I would like a little audience interaction here with an audience show of hands. I will be talking about data and information and I have a question for you. How many of you have projects or are associated with PPSR projects that are generating data or information? I would say that is about 90 percent of you. Of those of you who raised your hands, how many of you have a written data use policy? How many of
you have a written data stewardship plan? It looks, from the show of hands, like there are some programs that do think about managing their data stewardship and long-term sustainability, but many others don’t have that sort of thing in place.

In this working group, Andrea Wiggins and I will be working with you to identify questions we would like to ask of the broader community about how they are thinking about data and information: How are they managing it? What are their stewardship plans? Who are their users? If you are a user, what do you expect in terms of data?

We already have a list of questions that we are thinking about putting together for a survey. The survey will be used and we will be presenting some of the information back to the community in a meeting that we are going to have in Syracuse in late May with a group of folks who are looking at PPSR from a data perspective. From that survey, we are going to be working to try to develop best practices for data management for PPSR projects.

That May meeting is partially funded by Data-ONE, which has a PPSR working group that I co-chair. There is also an NSF-funded project with Kevin Crowston and Andrea Wiggins at Syracuse to hold a workshop to think about data management. We are putting the two workshops together in one, so there will be about three days of people thinking and talking about this and leveraging any feedback we might get from you.

**Selecting Breakout Sessions**

Each breakout group staged two separate sessions of a half-hour each. Participants begin at one session of their choice and then switch groups for the second session of their choice.

**Brainstorming during the data management session**

**Hearing About and Taking Action**

**Ed Salt, Facilitator**

Management consultant, Training Resources Group

We are at that point in the workshop where each of us is individually thinking about what we are going to do with all of this, what we are going to carry home, what actions we are going to take. It’s important to have that individual focus on what you are going to do after a workshop like this, but it is also good to continue to feel part of this larger group that has spent time together over the last two days, and the actions coming out of our larger discussions.

After these breakout sessions, leaders of each of the five groups will share with us any themes that came out of their discussion, specific next steps that they envision or are committed to taking, and then anything that any of us might do in the coming weeks and months to contribute to these next steps.
Action Steps Report-outs

Building an Association for PPSR

Rick Bonney, Project Co-Principal Investigator
Director, Program Development and Evaluation,
Cornell Lab of Ornithology

We were really busy in this group and most of you came to one of our two sessions. Robert Petty said it earlier in this workshop [paraphrasing Arlo Guthrie]: If you have just one person who comes in and talks about an association, they’ll think he’s really weird and they’ll ignore him. If you have two people, they’ll think they’re both crazy. But if you’ve got 50 people talking about an association for PPSR, all you’ve got to do is sing it the next time it comes around on the guitar.

We decided that the time is right to form an association, and that it would be a service association that would really provide benefit for people who are learning and developing and implementing projects. All of the ideas presented were met with universal agreement. One was the idea of a journal that would focus not on the data that are collected, because that needs to stand on its own in scientific

Components

- Annual conference
- Journal
- Training in project development and implementation
- Raise professional standards in evaluation
- Leverage funds

Discussing the formation of a PPSR association
journals, but on best practices regarding how to actually manage these projects and move them forward.

There was agreement that we need to consider an international focus and not just focus on the United States. An annual conference would be held that would be open to everybody. Eventually, regional training workshops to help people learn more about PPSR would be appropriate and needed.

This would also involve taking the citizen-science.org website and figuring out what to call it and how to manage it as a community endeavor, and how to house it and keep it growing. Those seemed to be the essential ingredients for moving an association forward.

SESSION NOTES
Karen Oberhauser
Associate Professor, Department of Fisheries, Wildlife and Conservation Biology; Director of the Conservation Biology Graduate Program, University of Minnesota

Challenges and Uniqueness
• Interdisciplinary nature of organization.
• The practitioner side will be unique. This combines academics and practitioners. Similar to what’s going on in Zoos.
• Push to recognize practitioner—small local groups.

What to Call It?
• Association, Membership, Alliance, Society (may be less elitist, and embrace practitioners and users more effectively).

Models
• This could be similar to the museum-related Visitor Studies Association (VSA), which began 20 years ago with a focus on studying museum-visit impact on visitors. Association activities include: professional journal, paid editor, annual meeting, annual membership fee, professional training/workshops at meetings, database of evaluators, wiki, and an online manual for PIs on external evaluation.
• Environmental communication network.

International Issues
• This should be global. How do we do that? There is a loose affiliation of European projects. “International” should be in the title of the journal. Include multiple languages. NSF might support travel back and forth, but ISE doesn’t pay for anything external. There is a meeting in Copenhagen this summer—Workshop on Lay, Local and Traditional Knowledge and Citizen Science.

Concern: Overlap with Other Organizations
• For example, the Citizen Science Alliance is moving ahead with a journal. They are a platform for visualizing and analyzing visual data. There is a group in Maine holding a symposium on citizen science. However, we want to retain respect, openness and professionalism of the field. Perhaps try to build coalitions of groups. Timeliness is important, and this is an opportunity. It would be good to jump on it now.
Next Steps for the Citizenscience.org Website

Jennifer Shirk, Web Content Support
Project Leader, citizenscience.org,
Department of Program Development and Evaluation,
Cornell Lab of Ornithology

We discussed what to call this and there might not be a problem with keeping “citizenscience.org,” since that is already in place, but I would welcome suggestions from anyone who feels strongly about using a different name. We want this to be something that serves as many different people doing this work as possible and we certainly don’t want the name to be a barrier to entry.

One thing we discussed was which aspects of the site people find most useful. What I heard, which corresponds to what I’ve learned from checking Google Analytic stats, is that people come to network. A lot of the searches people do on the site are for names of other people. Visitors often turn to both the project database and the reference database, and both need help. We currently have work underway on the project database. The reference database is something that I’ve included in my question to participants. We need a tool that will enable anyone to add references about citizen science and PPSR and tag them, search them, and comment upon them. I have not yet found the right tool, so if you know of one please let me know.

Regarding action steps, one thing that is needed that can easily be done is to provide resources that we can all turn to, including pictures that people can use in their slideshows that demonstrate the work that we do. There could even be slides and slide shows themselves that talk about what this is and why it should be done.

Some quick and easy things we could do would be to set up a Flickr group, a slideshow group, and a Facebook group. How many of you would like a Facebook group associated with this site? I am still not sure about that, but it is on the table and we might go that route.

Regarding next action steps, if you know of or have useful reference tools, please tell me about them. We also talked about a listserv and whether a listserv would be a helpful and meaningful way to get people talking with each other.

Blogging
• How many of the PPSRs here have a blog? Perhaps that is something else to think about as well. • Madhusudan Katti, California State University, Fresno, and Fresno Bird Count
other, and I’m seeing a lot of head nods as I say that. The one thing about listservs is that in order for them to function, and function well, it can’t be a venue in which people only post questions, people have to actually answer those questions as well. As a first step towards that, I would encourage you to bring as many people as you can into this conversation, into the fold, into this group. On the website, at the top of the page, there is a little “Join our E-list” icon. Have folks whom you know who are doing this work sign up, and they will get on our one-way outgoing listserv, which is the first step if we want to build up to a conversational listserv.

A PPSR and Conservation Module for *Tools of Engagement*

Judy Braus, Project Co-Principal Investigator
Senior Vice President for Education and Centers, National Audubon Society

We had two really great groups, and it was way too quick. We decided that the association group looked so popular that they should produce this module that we are supposed to produce. We talked about the fact that one of the deliverables of this grant is to produce something on PPSR and conservation, and we started talking about what that might look like and heard a lot of good ideas.

We also talked about the importance of collaborating with citizen-science.org and their online *Citizen Science Toolkit* to figure out what is needed in the field and how we can put our heads together to figure out what those resources are. Our discussion included ideas for good links, audience ideas, and collaboration ideas. We also talked about the emphasis on people engagement goals and what that looks like. We talked about helpful tools such as a “frequently asked questions” section on input, output, outcomes, logic models—all of the issues we’ve been talking about here.
It’s hard to build on something that has been done if you haven’t actually read what has been done, so we tried to take a look at what the Tools for Engagement are and then think about what we might need that is not there. We also talked about some of the presentations here—indigenous cultures, reaching out to underrepresented audiences, adding the international link, the human rights link—and how that fits with all of this.

And finally, we talked about what is going to be most useful to all of you. The best part of this is that I have a list of people who are going to stay engaged on this side of it. We will collaborate with Jennifer Shirk and her team to see if we can put our heads together and figure out how to do this.

What Is DEVISE and How Can Participants Get Involved?

Tina Phillips
Evaluation Program Manager, Department of Program Development and Evaluation, Cornell Lab of Ornithology

This group was a little different in structure because it was a presentation of the DEVISE grant award that we are currently enacting. In general I was surprised at the level of buy-in and support for DEVISE. I was expecting a lot of push-back in terms of being able to pull something like this off with the idea that we can provide generalized tools, instruments, and strategies for evaluating our programs, but also enable people to do that in a customized way.

We did hear from the feds in the group about the need to be aware, when you are talking about evaluation, of special circumstances when using federal resources or lands and requirements that we need to take into account—all of the sort of legal, ethical issues entailed in dealing with the feds and with bureaucracies. I have to learn more about that.

I also have a list of people who are very interested in helping, and I will be contacting all of these folks for their input on DEVISE in the next few months (and hopefully years). I’m going to ask Carol Saunders to share her thoughts on what went on in this session.

Carol Saunders
Research Faculty, Environmental Studies Department, Antioch University New England

Mostly I was just getting up to speed on what is
going on with DEVISE, which I think is a great idea. Some of the issues that emerged were the kind of tools and challenges we might face. For example, with some of the tools that exist for measuring things like environmental connectedness and attitudes, people who participate in PPSR efforts often score high on those scales. The challenge is how to find ones that don’t have what we call the “ceiling effect.” If the participants are all already on board with high scores, you can’t use the tool to measure change. We discussed some creative ways of getting at that. I’ve tried a number of approaches in a zoo setting, from concept mapping to drawing analyses and other ways besides surveys, so this can be very rich depending on what we are trying to get at.

We also talked about age-related instruments. There is always a challenge in using standardized measures, but when appropriate it would allow us to compare across projects. We talked about unique identifiers that could help us with potential longitudinal data. There was a lot of excitement about helping people who are trying to do evaluations on their own. It mirrors a lot of what has happened in the zoo world, which I am familiar with, where you have people who aren’t evaluators but just want some help getting started so they can collect information. Beyond a certain level, there is often the need to have more sophisticated analyses done externally or by some centralized place. I think the PPSR association could be a place for that.

Best Practices for Data Management for PPSR Projects

Jake Weltzin
Executive Director, USA National Phenology Network, USGS

Two groups came through and we poured out our hearts on page after page, and Andrea Wiggins managed to capture a lot of that. Our goal was to first go around the group and have each person describe why they were there, and then describe what they think is the major issue with data or information management for their PPSR or for all PPSRs as a whole.

Part two was to provide feedback on a survey with a huge number of technical questions about information management. We didn’t have enough time to really get through those, but we welcome your comments and are asking for hard-copy comments from the group. I have one or two copies of the potential questions. We will take the comments and feedback that we get from the groups here and simplify the survey, define a set of high-priority questions, and if we are successful, we will have this out on Survey Monkey and will probably include everybody here once I check with the
organizers to make sure that’s okay. We want to get the word out as broadly as possible and then use the information that we get from the survey to understand the state of how PPSRs are managing information within their projects. We will characterize that and then use that information to do a gap analysis to identify key gaps in information management and where there are consistent needs.

Regarding consistent needs, I tried to encapsulate some of the conversations that we had in our two roundtables. With due respect to all of us, I am not a “datahead,” I just realized I had all of these bits of information provided by a bunch of people who spent ten minutes per, providing information, and I should do something with it to make sure it’s sustainable in case I get hit by a bus. I think about that a lot because I want my project to last 30 years, but I want the data to last forever. Data are forever, or they should be.

The idea of data management literacy is a key thing that emerged. People want to have a good understanding of what is going on. There is a lot of interest and people saying they want to manage their information better, and they want information about how they should do that. What people said they wanted included best practices on data management, data stewardship, and data policies. We need policies for how we share information, how we store information, and how we steward information through time after we get hit by the proverbial bus.

We need better access to standardized tools for data storage and analysis. Wouldn’t it be nice if there were a PPSR data Excel file that you could download and it would just manage all of your data for you? It would be something extensible, it has version control in it and everything else, and you could also do some simple analysis and just plug it into your project. Not every project needs that, but that was the feedback I was getting from some of you who would like that.

We need better access to data. A lot of you are aware that there are a lot of other projects out there that are collecting information, and you don’t necessarily have access to that information, even though they might be willing to share it with you, and there lots of other kinds of data sets out there. And when they find out about the data you have, they’re going to want access to your data. We all need better access to data. We need to think about data integration, taking different data sets and putting them together. We need to think about interoperability.

There are some property rights issues that people mentioned. Whose data is it? If you have the public, contributing information to your database, whose information is it? Do you have full rights to use that information? What are your obligations back to them? Do you owe them anything? What if you publish it with your name on the paper and not theirs?

Then there is documentation. We need to have better documentation about what we are

Software That’s Easy to Use and Manipulate

- I think the reason we talked about using Excel is not because there isn’t other software around, but to make sure that people can change it easily if they want to. There are other tools in the cyber realm that people can’t change. • Finn Danielsen, Ecologist, Nordic Agency for Development and Ecology (NORDECO), Denmark

- Something simple and extensible. • Jake Weltzin

- Exactly. • Finn Danielsen

Data management needs
Doing, and that gets back to that proverbial bus coming at us. Have you documented well enough what you are doing for your data management in your project so that someone could pick up that dataset, look at the documentation, understand how you managed information, what it all means, and carry on?

EXCERPTS FROM SESSION NOTES

Andrea Wiggins
PhD Candidate, Syracuse University
School of Information Studies

Some Issues and Questions

• Tension between access and privacy.

• The balance between rigor and suitability for people at a local level with relatively little education and potentially low usability.

• In working with remote data collection sites, installing high tech ideas in remote areas will be difficult.

• Use of data: scientists think it should be used in certain ways due to authorship, while other stakeholders have different views of how to use it.

• Changing the academic community and how we are evaluated on peer reviewed publications and so on—the research culture.

• How can protocols be developed for data management, stewardship, and access, especially for data collected in collaborative, community projects? There might be IPR (intellectual property rights) issues, there might be concerns for privacy. How might that be different from projects that are driven by more formal science?

• Is there a difference between natural and social science data management and perspectives?

• How do we put boundaries around data and manage data that belong to a community, and what sort of contract or agreement do we use with communities when they enter into a relationship?

Some Notes About Needs

• Bare bones practical advice: How should I have done this from the beginning, how to move forward from here?

• We have a lot of data, don’t know how to use it, don’t know who’s allowed to use it.

• In a project with lots of observational data and people e-mailing photos, it would be nice to link photos to observations. There are other sets of information about the observers themselves, a different type of data in a separate spot. Would like to incorporate all these data together in useful ways.

• We have boxes and old computers full of data that are just sitting there, we’ve all been there. The whole concept of data scares a lot of people. Anything that takes away that fear and makes it easier and more accessible would be good. Let’s make “data” more accessible.

• An online toolkit that is compatible with other systems, a web recording system you can use locally but is compatible with national mapping systems.

• A simple program to organize the data for access, interpretation, and review by all different kinds of people, including community members, participating scientists, policy people—something simple around which everyone can converge.
Closing Remarks

Introduction
Meg Domroese, Content Coordinator
Outreach Program Manager, Center for Biodiversity and Conservation, American Museum of Natural History

We have come down a long road since we started this workshop, and for one really did enjoy, benefit from, and struggle with a lot of the issues that were brought up. Eleanor is going to offer a recap of the road that we have traveled in the last couple of days.

Eleanor Sterling, Project Principal Investigator
Director, Center for Biodiversity and Conservation, American Museum of Natural History

Yesterday morning we started the day with the thought that conservation is as much about people as it is about biodiversity. As Rick Bonney pointed out, all ecosystems are influenced by people. Conservation is dependent on managing, appreciating, and involving people across all walks of life, and public participation is a crucial way of engaging people.

We as organizers recognized this and encouraged NSF to recognize this as well so that we could all come together to ask, how can we do public participation in scientific research better? How can we strengthen the research products and how can we ensure that the public participants reach their own expectations?

As you will remember, we came together over three objectives:

1. To share success stories and take stock of progress in linking PPSR and biodiversity conservation;

2. To identify key strategies for developing conservation-related PPSR initiatives that contribute to participant learning and to scientific/conservation knowledge for society; and

3. To generate ideas for promoting communication, networking, and partnerships among individuals and organizations working in PPSR and conservation.

We engaged in a variety of activities in order to meet these objectives, not the least of which were the conversations beside the coffee urn. I found the overview talks yesterday morning very helpful in framing what has already happened in PPSR and why we use the term PPSR instead of citizen science. That set the stage for the tasks in front of us by reviewing what we have done to date and what is already out there. I really liked the fact that we didn’t just get handed the set of key questions that our planning team had spent months coming up with and many of you contributed to. Instead, we got tantalizing tidbits of case studies that helped to exemplify
those questions. That helped bring them to life and helped us think about how we frame these questions to help us organize past and future efforts.

We heard how effective collaborations tie conservation efforts to larger issues that the public cares about such as water and environmental policy, land use, and socio-economic issues. These brief glimpses of projects illustrated the potential for public participation to be mutually beneficial for both scientists and the public. Some of the projects have shown us how communities can identify a problem and work with scientists to research that problem and identify and implement potential solutions. Some of the projects showed us how scientists were able to gather large quantities of data that would be difficult to obtain by relying on a small cadre of scientists. The projects have shown us how participants are able to connect and engage with the larger world, and to actively participate in the management of resources that directly impact their lives.

We also learned that PPSR initiatives can serve as tools for cultural exchange in which people from different cultures come together with a common goal for conservation. We also heard cautionary tales about how individuals from different groups felt rejected in their efforts to bridge the gap between science and the general public, and we need to take those into consideration as we think about the future.

The collaborative group work in the afternoon that focused on the experience of existing projects brought home how important it is to have a structure or framework that helps us to take a step back from a good idea and explore the anatomy of collaborations, allowing us to ask questions that help us to figure out the context, audiences, wherefores and hows that are so important to effective initiatives. Yesterday also fed into the process of modifying the framework on which we were building to be most useful for a variety of audiences.

This morning we reviewed what we learned from the matrix, mapping steps and questions. Some critical ideas that came out of this work include:

- The recognition that a multi- or transdisciplinary approach is important for these initiatives. The work needs to be scientifically relevant, community-connected, and co-created as well as collaborative. This involves bringing in individuals from diverse backgrounds at the beginning of a project, from the design phase on.

- We can approach collaborative initiatives between scientists and the public from a variety of angles: as scientists benefiting from the increase in data that can come from committed participants, but also as communities benefiting from the expertise of other community members and scientists to resolve a problem.

- We need to diversify, involving not only stakeholders from across traditional groups.
(the proverbial “chorus”), but also engaging non-traditional partners, such as the example of involving commercial fishers that we heard this morning. Finding common ground with a wide range of people can do much to strengthen conservation and public participation efforts.

- We need to work to maximize participant engagement by providing multiple opportunities and low-thresholds for entry. We should make it easy for participants to get engaged and stay engaged. And we need to ensure that there are opportunities for participants to move from contributing to collaborative to co-created experiences.

- We should work hard to help volunteers and community members not just collect but also understand, analyze, and disseminate the data. One critical tool for this is working with participants to find their own stories in the data.

- We can extend our impact by designing projects that incorporate conservation actions as an object of study even when this is outside the initial project scope.

- We can develop and use metrics that help us to examine multiple categories of behavior (attitudes, action, advocacy, etc.) and assess changes in individuals over time and across programs in conservation actions.

- We can design research protocols that make sense scientifically but also take into account outcomes and constraints for both the protocols and trainings. That may involve some kind of iterative protocol development that finds the balance between data needs and participants’ needs and abilities.

- We consistently heard about the importance of designing projects that foster feedback and dynamics between lay and traditional knowledge and scientific knowledge, between different “ways of knowing.” One example of this is that we can work to develop scientifically and culturally credible protocols and procedures. We heard some great examples of this, such as Jon Waterhouse’s account of what is now happening with the Inuits in Alaska using GPS units with culturally relevant icons and data fields.

This morning and early afternoon we again grounded our work in specific initiatives in the making as we worked in a design studio format that allowed us to explore potential future PPSR activities. One group focused on engaging tourists in the Galápagos, where some of the biodiversity that could be monitored is easy to identify and thousands of tourists pass through annually. It’s a wonderful low-hanging fruit to think about in terms of a PPSR initiative.

The phenology group discussed the fact that many people...
make observations that could be useful without even being aware of it, and offered an example of a low threshold of engagement and a way to move people from being the audience to being actors.

The group working on revising the steps for conservation outcomes discussed whether we should modify the steps or create new ones, and emphasized the importance of integrating ethics in the framework. They noted that if conservation is an important outcome, that needs to be an intentional part of the design of the initiative.

Another design group discussed how museums can become a hub for PPSR in conservation, pointing out that museums have a range of resources, expertise, established reputations, and access to audiences, and can be a connection point for local individuals or groups for PPSR opportunities.

Another group raised the question of understanding how PPSR can improve the conservation of biodiversity while also improving the livelihoods of Indigenous peoples and other local communities dependent upon natural resources. They emphasized that there is a zero step that we all need to think about, a “deep hanging out” step that we need to approach with a sense of humility and learning. This is a step that we often forget and is often difficult to support with the project development and design and funding constraints that we have.

They also emphasized that each decision point is context-specific, requiring an “it depends” approach that is reliant on context. The steps serve as a guide but may need to be adapted depending on the situation in which you are working.

They discussed the challenges in terms of data sharing, particularly regarding information that addresses sacred or locally-owned information. They pointed out that stories can be viewed as an outcome as opposed to a peer-reviewed article.

There was a group that focused on including PPSR and conservation in outdoor programs, focusing on underserved populations and people of color. They emphasized the importance of both conservation and community outcomes and talked about the idea that groups may enter through getting outdoors and environmental justice issues and move laterally into conservation questions.

In this last session we focused on concrete next steps in a series of breakout sessions. Rick Bonney talked about building an association for PPSR and decided that we are all part of that association. Jennifer Shirk focused on next steps for the citizenScience.org website and did a great job reviewing action steps, including compiling resources that can demonstrate how PPSR projects work, and why, and broaden the groups of people who feel they can engage in PPSR initiatives.

Judy Braus reported on discussions that occurred in the group focusing on conservation...
and PPSR modules for *Tools of Engagement*. They discussed ways of collaborating not just within their group but across all of these groups. They also talked about expanding the focus to how to engage people and how to measure that engagement, rather than restricting the focus to the traditional metrics or goals related to data. They talked about logic models, outputs, outcomes—all of those important things we need to think about as we go on from here—as well as integrating underrepresented audiences into our activities.

In the DEVISE group, they let everyone know what they are doing and how others can get involved. They received a lot of buy-in and support as well as a list of helpers. Among other things, they talked about the fact that a lot of people engaged in PPSR already exhibit a high level of affective behaviors that we want to support through PPSR, and the need to figure out a way to measure their progress beyond that “ceiling effect” so that we are able to measure change in people who are already fairly engaged.

In the group discussing best practices for data management for PPSR, they emphasized the need to plan for what happens to your project and its data if you get hit by a bus. They pointed to the need for data management literacy and data management for posterity, and their efforts to gather best practices for data management, stewardship, policies, storage, documentation, and access to standardized tools for management and analysis. Importantly, thinking back to some of the issues discussed earlier in this workshop, they also talked about data and information ownership issues and obligations.

That is my very brief summary of what I took from the two days we had together. It was actually exciting to sit back and think about what we learned. Throughout these two days we have emphasized that people are coming to PPSR initiatives from very different backgrounds for different reasons. Engaging those people happens not just on a technical level—data collection, monitoring and implementation—but also on an emotional one. I think that is true of those of us in the room as well. Each of us has come from a different background and there are different reasons why we are in this room. We know that building social capital is critical to effective programs and projects, and this two-day workshop has done a terrific job of creating a community of practice in PPSR.

I told my husband last night that I love these meetings because of the incredible energy and enthusiasm of the participants. I challenge us to bring that energy into post-workshop activities and into building and maintaining a network that improves public engagement with scientific research.

**Acknowledgements**

- A lot of work occurred during this workshop and a lot of great ideas were generated. I want to thank all of you for your contributions, for your thoughtful deliberations in the breakout groups, and for your report-outs. And I would like to express appreciation in advance for the continued work that I am sure we will be doing together. I would also like to thank all of the members of the project team for their contributions in making this come together. Finally, I would like to thank the folks in the Center for Biodiversity and Conservation for their great support and work in helping this run so smoothly. • Meg Domroese

- There are two people I would particularly like to thank. One of them is Meg Domroese, who worked to organize all of this, and the other is Ed Salt, who guided us through. This has really been a collaborative effort. I think we all learned a ton and made a lot of new contacts, and a lot of learning and ideas were shared. This has just been terrific. • Judy Braus

- And let’s thank the National Science Foundation for bringing us all together. • Rick Bonney