

AIM-UP! Fastlane First Annual Report
What People Have Worked on the Project?

<u>Participant's Name(s)</u>	<u>Project Role(s)</u>	<u>>160 Hours</u>
Joseph A. Cook	Principal Investigator	Yes
Scott V. Edwards	CoPrincipal Investigator	Yes
Eileen A. Lacey	CoPrincipal Investigator	Yes
Stefanie M. Ickert-Bond	CoPrincipal Investigator	Yes

Are any other persons involved with the project? (Max is 25).

Carla Cicero
John Demboski
Scott Gardner
Robert Hanner
Bryan Heidorn
Eric Hoberg
Tricia Jones
Jeremy Kirchman
Dusty McDonald
Philip Myers
Tom Turner
Christopher Witt
Tomislav Urban
John Wieczorek
Kayce Bell
Rob Guralnick
Kim Hastings
James Hanken
Hopi Hoekstra
Enrique Lessa
Stephen MacDonald
Will McClatchey
Craig Moritz
Link Olson
Sandy Talbot

What Other Organizations Have Been Involved as Partners?

Are any organizations other than yours partners in the project, or have they been?

Animal Diversity Web
Barcode of Life
USGS Alaska Science Center, Anchorage
Florida Museum of Natural History
University of Michigan Museum of Zoology
Botanical Research Institute of Texas
Texas Cooperative Wildlife Collection

New York State Museum
University of Texas Advanced Computing Center
University of Colorado Museum of Natural History
University of Nebraska State Museum
Denver Museum of Nature & Science
University of Arizona
U.S. Department of Agriculture, National Parasite Collection, Beltsville
Yosemite National Park, U.S. National Park Service

Have You had Other Collaborators or Contacts?

If so, please describe below:

Alan Prather, Michigan State University and CollectionsWeb (RCN)—we are connecting our respective RCNs where they intersect with regard to educational themes and missions.

Will McClatchey, Botanical Research Institute of Texas—preliminary discussions have pointed toward common themes that cross anthropology and biology education using museum collections.

Jim Spadaccini, Ideum---preliminary discussion of common themes between IDEUMs informal science education initiatives with museums and AIM-UP!.

Szu-Han Ho, Art and Ecology Program-UNM---two undergraduate courses in Art Department are now using museum collections as basis for student projects. Discussions have revolved around integration of Art and environmental sciences and potential to trace the development of the careers of renowned museum Arctic biologists from Art perspective.

Jessica Light-Texas Wildlife & Fisheries Collections---interest in integration of collections-based host/parasite themes into undergraduate education experiences.

David Reed-Florida State Museum of Natural History-- interest in integration of collections-based host/parasite themes into undergraduate education experiences.

Laura Carsten-Conner, Education Director, UAM — interest in integration of collections-based themes into teacher training workshops to be held this summer at the museum as well as at rural sites throughout AK.

Activities and Findings

(1) What have been your major research and education activities (experiments, observations, simulations, presentations, etc.)?

Graduate seminar. AIM-UP! Participants at the University of New Mexico organized a weekly seminar entitled Integrated Inventories, which was held during the Fall 2010 semester. The course provided a discipline-specific overview of how natural history collections operate; these overviews provided the foundation for a series of discussions regarding improved integration across taxa to expose students to natural history collections and collecting methods. The course also provided a forum for initial discussion of museums-based educational models that can be developed for undergraduate courses. Graduate students in the seminar developed pilot modules that were presented to all members of the seminar at the end of the semester.

At UNM, a total of 34 people participated in this seminar (7 faculty, 8 staff, 2 undergraduate students, 17 graduate students). Five people – including the 4 Co-PI's for the RCN – participated in the

seminar via video conferencing. Given the successful participation of these individuals, we have discussed expanding the seminar so that in future years it would include students from each of the other core institutions (Harvard, Berkeley, Alaska), with these individuals participating electronically.

Student surveys. Participants in the seminar course determined that periodic surveys of the undergraduates at our institutions would be useful for determining the level of undergraduate awareness of our respective collections as well as undergraduate perceptions of the importance of collections to different biological disciplines. Building upon discussions held during the seminar, we designed a survey that was distributed to a variety of courses at UNM, Berkeley, and Alaska at the start of the Spring 2011 semester. Preliminary survey results are provided in the next section of this report.

Annual workshop. The RCN hosted a meeting in Santa Fe, New Mexico 14-16 October, 2010. Twenty-two people from 12 institutions participated (with 1 participating remotely). During the meeting, attendees discussed all the objectives of the RCN, formed questions to be addressed, and developed a plan to address those questions. Committees were created and charged with specific goals and tasks. A format for the yearly fall seminar course was developed. Participants discussed and developed goals for evaluation of RCN activities. A website to establish a web presence was planned and launched with development of content a major goal of the next year.

Advisory Board (largest level of oversight and planning)—Steering Committee + Reps
 Bioinformatics and Web Presence (nuts and bolts of electronic interactions)
 Outreach (connecting with other networks, institutions, professional meetings)
 Education (developing modules and other deliverables)
 Development and Design (sustainability, sponsorship, graphics)
 Evaluation (assessment of success)

(Last) What are your major findings from the activities identified above?

Undergraduate surveys. The courses and number of survey respondents at each of the participating institutions were as follows:

Institution	Course title	Upper/lower division	# respondents
UNM	Tropical Biology	upper	14
Alaska	Entomology	upper	7
	Vertebrate Paleontology	upper	7
	Systematic Botany	upper	10
	Ichthyology	upper	19
Berkeley	Mammalogy	upper	32
	Ornithology	upper	7
	Intro Biology	lower	71

Analysis of survey results is still in progress, but data from the introductory biology course surveyed at Berkeley (a randomly selected subset of students representing ~ 15% of total course enrollment) indicate that the vast majority (71%) of lower division undergraduates included in the survey are unaware of the existence of the Museum of Vertebrate Zoology and less than 8% of these students have visited the MVZ. When asked to rate the importance of natural history collections to undergraduate education in several biological disciplines (1 = unimportant, 5 = very important), mean scores ranged from 3.27 (systematics) to 4.18 (physiology); this outcome is particularly intriguing given that systematics has traditionally been the core of museums-based science. Overall, these data suggest that lower division undergraduates (1) are not aware of museum resources available on the Berkeley campus and (2) do not understand the relevance of such collections to multiple disciplines within biology.

This initial round of student surveys was extremely useful in terms of identifying issues related to survey design and distribution that will be addressed in future years. For example, most of the upper division courses polled are taught by museum curators and thus students in these courses are likely biased in favor of being familiar with the museum at their respective institution. As a result, future sampling of upper division courses will be spread among museums-based classes and classes that do not have a direct museum connection. Further, because courses taught by museum curators frequently introduce students to museums collections during their initial meetings, the timing of survey distribution within the semester may also bias the data obtained. Building upon these experiences, we will implement an improved round of survey distribution during the 2011-2012 academic year in order to gain a more comprehensive assessment of undergraduate knowledge of museums during the early phases of our RCN project.

Annual workshop. At the meeting in Santa Fe, attendees discussed the objectives of the RCN, formulated questions to be explored by the network, and developed a plan to address those questions. Committees were created and assigned tasks. A format for the yearly fall seminar course was determined. The participants discussed and developed goals for evaluation of the effectiveness of the RCN. A website and list serve was planned and executed.

Training and Development

What research and teaching skills and experience has the project helped provide to those who worked on the project?

For the PI and 3 Co-PIs, the first year of the RCN has generated important opportunities to improve our skills at (1) survey design and implementation, (2) evaluation of project goals, and (3) public dissemination of RCN activities. Students who participated in the fall seminar course gained critical new insights into how natural history collections operate, including how the distinct challenges and traditions associated with different taxonomic collections influence ongoing museums based research. In addition, students gained valuable experience with use of museums databases while designing pilot educational modules as part of the seminar.

Outreach Activities

What outreach activities have you undertaken to increase public understanding of, and participation in, science and technology?

We worked with a Geographic Information Systems instructor to develop a lab activity that utilizes museum specimen and locality data for introductory GIS courses.

Educational modules were distributed to University of Colorado and University of Arizona bioinformatics courses.

Linked to ISLES a website promoting place-based studies using museum specimens from the Alexander Archipelago. ISLES is tied to University of Alaska Southeast (Sitka campus) and local high schools in Southeast Alaska.

Conferences: An AIM-UP! presentation was delivered at the annual Geological Society of America meeting in Denver Colorado in November. Abstracts for presentations on AIM-UP! have or will be submitted to 2011 meetings of SPNCH, American Society of Mammalogists, and American Ornithologists Union.

We worked with Education Director Laura Carsten UAM- Conner to incorporate museum-based activities in the teacher training workshops to be held this summer at UAM and at rural communities throughout AK. The activities will include work with historical herbarium specimens and making leaf impressions to show how increasing CO₂ levels are affecting stomatal density in arctic plants.

Publications and Products

In this section, you will be asked to describe the tangible products coming out of your project.

Specifically:

What have you published as a result of this work? As a result of discussion in the fall seminar course, Mason Ryan, a graduate student at UNM wrote and published a response to a paper published in Science in late 2010.

Journal publications: Ryan, MJ, Bolaños, F., Chaves, G. 2011. Museums Help Prioritize Conservation Goals. Science Express
(www.sciencemag.org/content/329/5997/1272/reply#sci_el_13658)

Books or other non-periodical, one-time publications none yet

What Web site or other Internet site have you created?

The AIM-UP! website was created (www.aim-up.org) and we are now building links to ongoing museum-based educational materials. The website has contact information for all participants, links to natural history collections, and links to multiple on-line educational resources and databases. Some of the educational modules developed in the fall seminar course are posted and more are in final

development. Introductory information to help get instructors started using online museum databases in their classroom activities has been developed and posted on the website.

What other specific products (databases, physical collections, educational aids, software, instruments, or the like) have you developed?

We developed educational modules targeting various undergraduate courses. These modules were posted on the website and distributed to instructors. We have initiated discussions related to the redesign of the curriculum for the Biology 203 laboratories at University of New Mexico (approx. 400 undergraduates enrolled per year) to include increased use of museums resources.

An educational kit on using museum herbarium specimens in climate change studies has been assembled and can be signed out for interested teachers. Two additional kits on making acetate peels from coal balls have also been completed.

Contributions

Contributions within Discipline

How have your findings, techniques you developed or extended, or other products from your project contributed to the principal disciplinary field(s) of the project? Please enter or update as appropriate.

Aim-UP! has stimulated dialog among a variety of museum curators, collection managers, investigators and undergraduate educators. Already the PI and Co-PIs have been clearly informed about need for increased understanding of museums and museums collections at our home institutions, which house some of the largest university-based natural history collections in North America. A total of 17 graduate students and 2 undergraduate students (and a number of faculty and staff) saw museum collections from a completely new perspective; very different from the research only use of collections that has been traditional.

Contributions to other Disciplines

How have your findings, techniques you developed or extended, or other products from your project contributed to disciplines other than your own (or disciplines of colleagues and associates not covered under "Contributions within Discipline")? Please enter or update as appropriate.

AIM-UP! is further developing connections to IT and biodiversity informatics groups by engaging them in the workshop and through the website. Because distance learning and experiential learning are rapidly being incorporated in undergraduate curricula nationwide, this effort to tap the vast resources of the natural history collections is timely.

Contributions to Human Resource Development

How have results from your project contributed to human resource development in science, engineering, and technology? Please enter or update as appropriate.

Our Fall 2010 seminar engaged a diverse set of students and other participants from 4 institutions and a diverse set of disciplines (geography, ecology, pathology, evolution, behavior, and a number of taxonomic disciplines). Students learned how these diverse disciplines have used museum collections as

a basis for addressing fundamental questions in science and how we might think about using these databases to design hands-on learning experiences for undergraduate students.

Contributions to Resources for Research and Education

How have results from your project contributed to physical, institutional, and information resources for research and education (beyond producing specific products reported elsewhere)? Please enter or update as appropriate.

We're working on it

Contributions beyond Science and Engineering

How have results from your project contributed to the public welfare beyond science and engineering (e.g., by inspiring commercialized technology or informing regulatory policy)? Please enter or update as appropriate.

No congressional visits yet