Engage Professional and Citizen Scientists to Survey the Biota of Olympic National Park—Coordination and Logistics: An ATBI Pilot Project

Final Project Report

INTRODUCTION/BACKGROUND

This project began as a National Park Service (NPS) effort to seed a pilot study that might one day develop into a full-scale All Taxa Biotic Inventory (ATBI) for Olympic National Park (OLYM). Conceived as an effort to collect only one or two major taxa, at only a few locations within the Park, the project received a big stimulus when T. W. Pietsch of the University of Washington (UW) received an NSF "Small Grant for Exploratory Research" (SGER) that supports some of the same goals. For the purposes of this Implementation Plan, and because the conduct of these two activities was considered germane to the organization of a future OLYM ATBI, the NPS tasks and those conducted with NSF funds were merged. As originally proposed the NPS-funded part of this project was to collect and identify aquatic and riparian beetles at selected locations within OLYM. The SGER grant was focused on the Elwha River Watershed in an effort to establish baseline data to document invertebrate and non-vascular plant communities before two dams on the river are removed. The NSF project was not restricted to beetles but does includes them, along with microbes, lichens, mosses, liverworts, fungi, other insect taxa, and spiders. A further change to the structure of the TA was implemented when Chris Marshall and OSU were unable to complete the complementary and collaborative task agreement to this one, J8W07070029. The NPS was forced to terminate the agreement with OSU and decided to redirect the funds to a new agreement (J8W07100003) with the UW for curation of the materials collected. This has meant that all work originally tasked for OSU has not been done. This resulted in the UW taking on many aspects of OSU's unfulfilled role. The UW conducted all of the collecting events and Beetle Blitz's associated with the completed work of this Task agreement. The most important change has been in the shifting of curation and preliminary identification work from OSU to the University of Washington. It has also been decided that the material collected will now be redirected to the California Academy of Sciences for permanent storage as part of a long term loan from the NPS.

Study Area: Olympic National Park

Methods/Techniques: As outlined in the Detailed Implementation Plan the work followed the model developed at Great Smoky Mountains National Park (summarized by C. Parker and E. Bernard, "The Science Approach to the Smokies ATBI," George Wright Society Forum, 23(3):26-36, 2006), both traditional and structured sampling was used.

Sampling was conducted during a series of intense, short-term (one or two days) collecting efforts (each referred to as a "Beetle BioBlitz") as well as long-term and consistent collecting using fixed locations and a standard set of traps.

Aquatic beetles were collected by hand, with small grabs and cores, push and kick nets, emergence traps, and black-lights; terrestrial beetles by hand, beating, sweep nets, and by light, malaise, pitfall, and flight intercept traps; soil-dwelling beetles by hand tools, sifters, and pitfall traps.

Locations of samples: Currently almost all of the samples are still at the University of Washington while performing final curation under TA J8W07100003. The only specimens not at UW are beetles that were collected during the Beetle Blitz of 22 August 2008 (<400 specimens). These were curated and sent to OSU prior to the NPS termination of its contract with OSU.

Results: Numerous collecting trips to OLYM were made during the first year of the task agreement with collecting conducted late into October of 2008. This included over 50 separate visits by groups of one to four participants, and three major week-long efforts (1-5 April; 28 April−3 May; 26 May−1 June 2008), each consisting of nine to 12 collectors. A six-day backpacking trip to the headwaters of the Elwha was completed in late July/early August 2008. The UW conducted four Beetle Blitz/educational forays with students and citizen scientists. These included two field events for students and teachers of the Crescent Middle School in nearby Joyce, Washington, one for Native American students of the Lower Elwha Klallam Tribe, one for Clover Park Middle and High School in Lakewood, Washington and a purely educational evening event for the Rochester Middle School in Rochester, Washington, Saratoga School in Stanwood, Washington and the largely Native American Wellpinit High School in Wellpinit, Washington.

UW also conducted a Beetle Blitz, on 22 August 2008, out on the coast at Ruby Beach, with eight participants, including students, various volunteers, and educators affiliated with the Olympic Park Institute. Sets of traps were run continuously from March to October at five locations along the Elwha and for a two week period in late August at three locations along the coast.

All pertinent data, including latitude and longitude, detailed macro- and microhabitat descriptions, collecting methods, date, time, and name of collector, were entered on-site into field databooks. Subsequent computer data entry was done by students and citizen scientist volunteers, i.e., entering their own data as part of the learning process, under careful supervision. Locality and taxonomic data generated by the NSF-funded portion of the project were made available via a dedicated website (*http://www.Elwha Biodiversity.org*), but we anticipate that all OLYM material will eventually be entered into the new NPS ATBI database template under development by Peter Kingston and colleagues.

Below is a list compiled from the project database of Taxa and the number of individuals that were collected for each:

Unit_Name	Sum of Individual Count
Diptera	>30000
Hymenoptera	17777
Coleoptera	13776
Hemiptera	9771
Acari	6215
Araneae	3342
Formicidae	2449
Trichoptera	2284
Plecoptera	2161
Collembola	1974
Aphidoidea	1406
Isopoda	531
Psocoptera	483
Opiliones	428
Chilopoda	351
Ephemeroptera	325
Thysanoptera	287
Orthoptera	238
Lepidoptera	210
Diplopoda	203
Dermaptera	203
Mollusca	88
Neuroptera	77
Dicondylia	76
Pseudoscorpiones	41
Symphyla	35
Siphonaptera	30
Raphidioptera	27
Odonata	14

Lists of species: Specimens have not been identified to species yet because of the termination of the contract with OSU.

Management Recommendations: Until more specimens are identified to species and the resulting data are analyzed we can make no management recommendations.

LESSONS LEARNED

Develop a data management plan: This must be done before anything else—it affects all aspects of the overall effort from training to final data entry.

Taxonomic expertise: This should be cultivated from the very beginning and treated as the limited and vanishing resource that it is. Experts should always be handled with care and respect and everything should be done to limit their workload to just that portion of the process that can be done by no one else. Funds should be reserved in advance for these experts; if possible, it should be a large percentage of the overall budget. Identifying specimens to the lowest possible taxonomic level is often separated by long stretches of time, well after the actual collecting events, but should not just be an afterthought. Experts should be engaged as early as possible to gain insight into their particular requirements for data and specimen collecting and handling.

Sufficient planning: Planning ahead will help with the inevitable chaos of unleashing volunteers into the wilderness. Logistics cannot be given enough attention in the planning stage. A successful Blitz hinges on well thought out and executed logistics. Printed data sheets or books for use in the field add expense, but are invaluable for increasing the likelihood of a volunteer entering all of the required data. Someone should be put in charge and trained in advance to check all the data as it comes in and make sure that all specimens are labeled before the end of the event. Anything that is lacking data should be discarded immediately.

Involve local community: We found an abundance of engaged and willing partners and volunteers in the area surrounding the park. The Olympic Park Institute was an ideal partner for our work. OPI personnel have the ability to provide highly trained and trainable educators to serve as experts and coordinators of volunteers. Extremely well plugged into the community, OPI can very easily locate and recruit volunteers. In addition, the facilities available at OPI are sufficient to house, train, and transport volunteers. OPI was an excellent resource that would be a vital component of any future long-term bio-blitz at ONP. Considerably less effort was put into getting large groups from the UW, which are relatively far away, it being much more difficult logistically and more expensive to get large groups to and from the park. Moreover, the simple fact that they aren't connected to the park or the local community, translates into less interest in the effort. The students and professionals that we did get from the UW were a smaller but more committed group and often had some background working with the target organisms. This meant that we could use them as "experts" to help train volunteers and coordinate and assist small groups in the field.

Training: We found that the most important aspects of training for a successful bio-blitz are safety, data handling, and collecting techniques. Safety needs no explanation and

must be tailored to the specific targeted environment. The importance of data associated with specimens collected cannot be overstated. Without sufficient quality and quantity of data the specimens collected are worthless and the effort and resources spent will have been for nothing. Training in the proper recording of data and labeling of specimens is much more important than the techniques of collecting. It is very helpful to teach collecting methods to volunteers, but having technically proficient collectors is quickly overshadowed when all the specimens collected have no scientific value. It was our practice to have people in each group of volunteers as gatekeepers to make sure that the data were collected and recorded properly and that no material went unlabeled. Fundamental to this effort is training in the proper use of global positioning system (GPS), what data to record with each collecting event, and the proper labeling of all specimens so that the data and the specimens can be reconnected. Basic collecting techniques were directly taught to volunteers who were then exposed to as many methods as possible. This often meant going to the collecting site weeks in advance and setting up traps to be collected on the day of the event. This provided a much richer experience for the volunteers and increased the diversity of material collected.

High ratio of "experts" to volunteers: What is meant by experts can be as little as someone who has been through training and participated in a previous bio-blitz, or an undergraduate or graduate student from one of the local colleges or universities who has some formal entomology training, or a PhD with taxonomic and collecting expertise in the target organisms. We thought of these people as coordinators who would take a portion of the larger group (ideally two to four people) out to collect and would be on hand to help with proper data and specimen collection as well as motivators that could give instant feedback and identifications for a richer overall volunteer experience.

Doing is best: While there is the very important aspect of enough training in advance to make sure data is accurate and usable, the best way to keep and engage volunteers is to get them involved as soon as possible in the actual act of collecting. Even if that means practicing all of the techniques taught during the training (including data management and GPS techniques) using catch and release. This has the added benefit of efficiently pointing to deficits in the classroom portion of the training.

Start small: This will improve the ratio of "experts" to volunteers and make sure there aren't too many logistical issues that will prevent the final results from even being usable much less the oft hoped for meaningful.

Over-collecting: This is very easy to do during bio-blitzes and is a major problem affecting long-term success. At each step of handling the specimens (collect, sort, curate, and identify) it becomes orders of magnitude more expensive than the last to process them. An unsorted lot in storage does nothing in the near term to advance understanding of biodiversity in our parks.

SUMMARY/CONCLUSIONS

By any measure this project was successful in meeting three primary goals: (1) to serve as a pilot project to demonstrate that large scale biotic survey and inventory can be conducted effectively and efficiently—both in terms of biodiversity (numbers of specimens and numbers of species) and geographic breadth—in ONP, by teams of relatively inexperienced citizen scientists, despite large areas of rugged, inaccessible terrain; (2) to provide rewarding environmental education for citizens who would otherwise never have the experience; and (3) to foster the importance and esthetic value of understanding and learning about biodiversity—what is there and the urgent need to protect it—in essentially pristine habitats that exist so close to home. We strongly urge the Park Service to consider implementing biotic survey and inventory in ONP on a continuing and long-term basis.

With many thanks for the support. We hope this brief report of accomplishments meets with your satisfaction.