

Proposal Title: *A New Vision for Onondaga Lake*

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Description of the Discovery Challenge opportunity: Building on a SUNY 2020 Challenge Grant of \$20 M, the Onondaga Lake Science Center will include new state-of-the art laboratories for water quality research and biological monitoring, a boat house and launch site, outreach programs and public access. The Center facility capitalizes on three decades of scientific work on Onondaga Lake and its watershed, coupled with a track record of success in scholarship and undergraduate and graduate education. This work has begun to address the more than century-long changes in a water resource that is sacred to our Native American Community and vital to the citizens of Upstate New York. **The Center provides a focal point for environmental monitoring of a uniquely remediated ecosystem, which still requires careful monitoring and assessment and presents a case study for ongoing research at the intersection of water-human interaction issues.** The remarkable response of this ecosystem, and approaches to speeding its renewal have global significance and applications that highlight SUNY-ESF. Integrated studies will include both the environment (plankton ecology to landscape processes) and human processes (social to behavioral responses). Public participation will include scientific demonstrations in the field and lab, informational displays, opportunities to meet new graduate students and scientists, K-12 education programs, and use of technology, such as the operation of a remotely operated underwater vehicle, as demonstrated recently at the NY State Fair.

The Onondaga Lake Science Center will feature three major research themes, provisionally titled: Resource Conservation and Management; Environmental Toxicology, and Humans and Nature. These themes will be supported through broadly-based faculty participation across the ESF campus, excellent facilities, and collaborative endeavors nationally and globally. Vital to the three-year program will be the announcement of RFP's from teams that will create and submit proposals to win substantial funding in support of the three major themes.

For instance, the current team sees the National Science Foundation's *Dynamics of Integrated Socio-Environmental Systems (CNH2)* funding opportunity as a fit for the crosscutting research that we envision the Center will support. **We envision submitting a proposal to document the unique case study that Onondaga Lake presents to aid in our understanding of how, for example, decisions about water diversions affect water quality and the social consequences for local peoples and economies.** The artificial cycle of moving water from Skaneateles Lake to Syracuse and then out to Onondaga Lake (and then to the Great Lakes) resulted in many changes. We will document 1) past and current city water and waste/industrial uses and resulting physical, chemical, and biological effects, 2) the differences for over a century in how Skaneateles and Onondaga Lakes and their watersheds and residents were treated and valued, and how that affected their water quality and use by various people, 3) the social and legal actions by indigenous people and local influential citizens that led to new engineering and

science remediation solutions, resulting in a recovery of the lake in a dramatically short period of time, and 4) identify other cities where similar actions could be taken, using Onondaga Lake as a model.

For decades, UFI has sponsored an annual Onondaga Lake Conference that served to connect our scientific understanding of the lake with the needs of community leaders and managers. We anticipate working with UFI, the Finger Lakes Water Hub and others in the first years to reformulate these past Onondaga Lake Conferences into an "Urban Water Cycle Renewal" Conference that could include work ranging from the Skaneateles Watershed through the City of Syracuse and out to Seneca River/Lake Ontario and would bring municipal, regional, state and federal/international stakeholders from the Great Lakes together. The idea is that Onondaga Lake, as a small scale system, with its amazing history of chemical, physical and social assaults on the ecosystem and its people, is a good test bed for how to resolve complex global issues of restoration and reclamation, including the historical physical, chemical, biological and social components.

The Discovery Challenge opportunity permits the timely and creative development of a program that jump-starts initiatives within the new facility. We envision a Symposium that creates working groups to prepare for 2020 studies of the biological, chemical and social environment. The planning teams hosted at the Symposium would represent not only experts in these scientific areas, but also Directors of Biological Stations at national and global levels, as well as Directors of ESF stations. Particularly fortunate is the availability of an existing Honeywell visitor Center, which can be utilized as early as 2019 for a variety of programmatic needs during the construction period of the Center facility, and the launch of the Discovery Challenge.

Description of undergraduate and graduate programs that will be impacted, including new degree programs, and how these new programs will better position ESF students for career advancement and leadership in environmental science, practice and policy: The new programs, particularly with internships that are jointly sponsored by ESF and Onondaga Community College, along with UFI and OEI are excellent bases for future contributions by students. These provide ideal opportunities for recruitment and retention of top students from New York and beyond. The programs will be deliberately attractive across the ESF campus to include student representation from each Department. We will reach out to other SUNY campuses as well, both for student participation and faculty collaboration, and ultimately to top private schools including for example, Syracuse University and Columbia University. New degree programs, especially those that bring together and simplify several existing programs, would be encouraged and facilitated through the activities of the Center. **The Center would also provide an ideal tool to market an international 1-year certificate program to train graduate-level students in remedial actions and research in freshwater systems. We anticipate that this would be of great interest to countries such as China, which is currently investing in the remediation of many of their freshwater lakes.**

List of agencies, partners, and funding entities either currently or anticipated to be interested in funding research, education, and outreach projects in the initiative area:

The Ska.nonh Great Law of Peace Center, Onondaga Community College, Onondaga Environmental Institute, Upstate Freshwater Institute, NYDEC, USGS, USFWS, New York Water Environment Association, Syracuse Center of Excellence for Environmental and Energy

Systems, Syracuse University, local school districts and private citizens interested in the full recovery of the Onondaga Lake watershed.

Description of how the initiative will expand current or create new partnerships with other academic, government, and private organizations: The formal partnership with OCC, UFI and OEI as well as creative collaboration through the Ska.nonh Peace Center and Syracuse University provides abundant new opportunities for program growth and recognition. Our long-term recognized collaborations with Syracuse University, USGS, USFWS, NYDEC and other agencies will continue to provide support and new opportunities to meet globally significant environmental challenges. The Center could additionally provide more hands-on opportunities to students from the Syracuse region throughout the year.

Description of how the initiative will increase the use of ESF assets, especially properties beyond the Syracuse main campus: Clearly, a new facility and program, off campus yet conveniently nearby, will greatly benefit the College and its programs. It will be a physical presence that highlights the ESF contribution to restoring this historic watershed. Development of the Center may provide an example of how some of our more distantly positioned campuses could be further enhanced or more intensely utilized, particularly through collaboration. It may also prove an attractive site for annual symposia by ESF field stations that enhance the contributions of our unique properties. The Center will provide facilities for institutional and at least regional meetings that enhance recognition of ESF.

How the initiative will inform policy decisions, enhance ESF's reputation, and have a global impact: The recovery of Onondaga Lake and its watershed is a global success story. Wherever the results of current studies are shared audiences concur that our solutions provide guidance for similar problems in their ecosystems. A thriving program based lake side, with conspicuous signage and active, visible programs will enhance ESF's reputation at home and abroad.

Description of new investments (including new faculty hires and support) required to move the initiative forward over a three-year period leading to financial sustainability by year four: Two new faculty hires in a) Aquatic Chemical Ecology and b) Human/Social Geography would be vital to the future growth and success of the evolving program, and to ESF's goals in scholarship, recruitment and retention. These faculty members would stimulate contributions from scientists from around the globe to develop solutions to their environmental challenges, while contributing to our student's training at the graduate and undergraduate levels. A new PhD-level graduate program that launches young scholars into global solutions of problems studied on our relatively small ecosystem would be a major contribution of the Discovery Challenge. Equipment essential to the program includes two Whaler-style 17-19'boats, a larger 21-24' boat suitable for deployment of instrumentation and student use (or a single, multi-purpose floating classroom), and a Remote Underwater Vehicle (ROV). The basic timeline would entail the Symposium and initiation of the Seed Grant Program in Year 1; purchase of the bulk of the equipment and hiring one faculty member in Year 2; and hiring the second faculty member and remaining equipment purchase in Year 3.