Dear Admiral Watkins:

In response to your request of October 16, which follows up on my presentation to the Ocean Commission in Chicago, I offer the following: First, I really do not have an opinion on how to strengthen collaboration between diverse Federal restoration programs with a variety of local constituent interests. This is an issue of political science and sociology, and lies outside my area of expertise. I am sure that other participants in the Chicago meeting can answer this question far better than I.

Second, with regard to how the academic community of researchers on the Gt. Lakes would break down a $10M per year additional budget in NSF for large lakes research, I am attaching a file (TCJ.response.---) that indicates the breakdown that was unanimously agreed upon by the participants in our Duluth workshop on the Science of Freshwater Inland Seas (SOFIS).

I have also attached a second file that is what I submitted to you in writing prior to the Chicago meeting (ocean.commission.report.TCJ.doc), in case you do not have it readily at hand. Please let me know if you have any difficulty opening these files.

On behalf of the academic community of Gt. Lakes researchers, I sincerely thank you and the Commission for considering the very important changes that we feel need to be made at the National Science Foundation, for the future welfare of our freshwater inland seas.
Sincerely, Tom Johnson

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Recommendation – NSF Funding for Basic Research on the Laurentian Gt. Lakes and Other Large Lakes of the World

The participants at the SOFIS workshop unanimously recommend that a separate budget be established for large lakes research in the Geosciences Directorate. This budget needs to be a line item (i.e., recurring annually), and must be overseen by an NSF program manager who will actively support the large lakes research community and be an advocate for future growth of that community. After much discussion about the level of the budget to be recommended, we concluded that a realistic initial level of funding should be $10M per year. A substantially higher budget could easily be justified, but the practicality of asking for much more, without demonstrating how easily such a modest sum could be expended productively, appeared unrealistic.

We envision annual expenditures, approximately as follows:

The Core Program: Investigator- conceived, basic research - $3.5M
The heart of any program in basic research lies in support of the innovative science that is conceived by individual (or small groups of) investigators who compete effectively for an identified pool of research funds. The new insights and major breakthroughs in our science often arise from the efforts of individual investigators. A core program of support for such activity is perhaps the best investment that can be made by NSF to further our understanding of large lake systems. The $3.5M per year would be split nearly equally among the four disciplines (biology, chemistry, geology, physics). This amount would support on the order of 20 - 30 principal investigators per year.

Major Initiatives: Time-series observations and interdisciplinary focus on selected lakes - $3M
Earlier sections of this report lay out several reasons why long time-series observations of environmental conditions are needed on large lakes. Among these are: the recognition that large lakes are regional indicators of environmental change; substantial inter-annual variability exists in the biota, thermal structure, and other properties; and our ability to accurately interpret the unique sedimentary record that underlies most large lakes requires a tighter link between modern lake processes, with their inter-annual variability, and the resultant sediment rain to the lake floor.

Many of the large lakes of the world are in remote settings where adequate transportation, research vessels, and shoreside facilities are lacking, and access to research permits and local governmental support requires advance planning. Multi-disciplinary expeditions to such lakes can ease the logistical burden imposed upon individual investigators, and will result in more science accomplished for the amount of money expended. The $3M per year would support time-series observations on perhaps four lakes world-wide ($2M) and one major expedition to a lake of focus each year ($1M).

Instrumentation and Facilities: - $2.5M

The Gt. Lakes research community currently has only one UNOLS research vessel, the 87 ft, 200 GWT, R/V Blue Heron, operated by the Large Lakes Observatory at the University of Minnesota Duluth. The vessel needs some upgrading (more berths, additional head, air conditioning in dry lab) but otherwise is quite capable for the near future. As the level of research activity picks up on the Great Lakes in response to this new program, however, the need for one or more larger, more capable research vessels will undoubtedly arise. The cost of new ship construction is not included in this budget of $10M per year.

The large lakes research community expects to install moored instrumentation as part of its long term studies, in lakes spaced across the substantial latitudinal gradient from the African and South American tropics to the Laurentian Gt. Lakes, to the high temperate/subpolar regions of Canada and Russia. The community expects to play an active role in the development of the new seafloor observatory program, with modification as needed for application to large lakes systems. ($1.5M)

Drilling operations on large lakes for paleoclimate research are expensive. The Earth Systems History (ESH) Program at NSF has co-supported lake drilling programs with the International Continental Drilling Program (ICDP), but deep lake drilling operations cut equally deep into the ESH budget as it currently stands. A drilling program is planned for Lake Malawi in January 2004, for example, that will cost approximately $2.5M for a 60-day project. This will allow drilling and sampling at four sites to a sub-lake-floor depth of only about 500 m – far less than the 4 km thickness of sediments that underlie this tropical rift lake. The new large lakes program should contribute to lake drilling costs in the future, in conjunction with ESH and ICDP. ($1M)

Graduate and Postdoctoral Fellowships: - $1M
Future stewardship of the large lakes of the world will require a new generation of researchers, teachers, managers and policy makers who have formal training in the highly technical aspects of large lakes systems. If we are going to attract the most talented students into graduate study, we should guarantee financial support to the most promising students to cover the costs of tuition, fees and living expenses. We recommend support for approximately 10 – 15 graduate students per year, allocated on a competitive basis. In addition, a postdoctoral fellowship program will be established, patterned after the very successful NOAA Postdoctoral Global Climate Change Fellowship Program, that will provide prestigious awards to approximately 10 postdoctoral scholars per year. New Ph.D.'s in any of the natural sciences will be able to compete for the postdoctoral fellowships, to work with a large lakes research group anywhere in the country. The postdoctoral scholars and their advisors will meet at a workshop annually year to make presentations of their science and to establish ties for future collaboration in the large lakes scientific community.