John Muir Institute of the Environment
University of California, Davis
Davis, CA
snluoma@ucdavis.edu; 650-804-9713

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Dear Brown-Nichols Award Committee,

I am writing to support the nomination of Dr. James Cloern of the US Geological Survey for the Brown-Nichols Science Award. Jim Cloern's contributions to the scientific understanding of the Bay-Delta and his work in making that science relevant to Bay-Delta water policy are unparalleled. There is no one who has contributed more to interdisciplinary aquatic science in California over a 35 year period. He is strongly deserving of recognition for his career as the best in his field.

I have known Jim since 1977. In the 35 years since then we have been friends, colleagues and collaborators. I know him well. His impressive record of accomplishments is accompanied by a truly unique creativity, a strong set of leadership skills and the tenacity and determination to make a difference. These are qualities that make a great scientist. Jim's curiosity is unparalleled. His tenacious determination to understand subjects outside his traditional expertise explains much of his creativity. He also has a long history of identifying the important problems in the aquatic science of the Bay-Delta well before others, and making the kind of impacts that cause changes in paradigms and the course of science. Recognition of his career accomplishments will help inspire others see the value of taking risks that can make a major change in understanding and pursuing policy applications of science.

A key ingredient in Jim's many contributions to the Bay-Delta is his strong dedication to collaborative, integrative, interdisciplinary science. He not only is an extremely talented practitioner but is truly curious about what makes integrated science work. He is a brilliant mathematician, and has used to tool to advance understanding of the implications of Bay-Delta hydrodynamics using elegant, sophisticated but yet simple mechanistic models to illustrate how physical processes drive phytoplankton blooms and phytoplankton distributions in the Bay-Delta. He is also a brilliant ecologist, as first evidenced by his demonstration 30 years ago that light and benthic grazing had major controls on phytoplankton populations in San Francisco Bay. The significance of that observation was that, although the Bay has long been nutrient rich it is not eutrophic. This was a seminal early accomplishment that was soon recognized by the policy community and affected the way water quality was managed in the Bay. He is a brilliant leader of people. He has mentored a number of the new leaders in Bay-Delta science, built amazing collaborations with some of the best minds in the field, and inspired us all

with his endless array of new ideas and novel studies. Finally, his courage is unparalleled in speaking "truth to power".

During his career, Jim has combined these talents to develop a body of work that impacts both science and management, using the natural ecosystems of the Bay and Delta as laboratories to demonstrate linkages among complex estuarine processes. He is a big thinker, as evidenced by his fundamental reviews of subjects like eutrophication, providing a context for San Francisco Bay among the estuaries of the world. He is a great observer of nature, and not afraid to question conventional knowledge when the data support it. This trait is evidenced by his observations of state changes in the phytoplankton of North San Francisco Bay in response to an invasion by an exotic bivalve in the late 1980's and, again, his recent observations of a state change in the Bay in response to changing ocean conditions.

Perhaps his most unique and important collaborations are those addressing the science of the Delta. Almost nothing was known about the water column ecology of the Delta in the late 1990's when an interdisciplinary team led by Jim began their studies of the system. Their work provided fundamental information about productivity in the water column, the most important sources of nutrition for the food webs, and how hydrodynamics of flooded Delta islands affected the ecosystem of those unique habitats. They taught us that the Delta is a nutrition-poor environment for food webs and that water quality is uniquely vulnerable to changes in how exports are managed.

More recently Jim led the beginning of a new study (CASCaDE) that is having what will be massive impact on how we evaluate potential impacts from climate change in the Bay-Delta. The idea is to combine what is known about climate, hydrology, watershed and ecological process in our best in-depth conceptual models for the Bay-Delta. Then develop feasible scenarios of potential climate changes and changes in how humans might manipulate the system and play out those changes using quantitative models. Jim built and steered this effort carefully. He assembled a team of the best minds working on the Bay-Delta in each of the fields above (before he obtained external funding). He presented the idea in a day of formal presentations to water leaders in California in order to make sure the scenarios were relevant to them. He led development of an effective proposal that was guided this massive effort and continues to be funded. But this is not just science. Their most recent paper incorporates what was learned into a set of indicators that policy makers can use to follow over the long-term the changes that are expected; and policy makers continue to talk of this scenarios approach as a model for evaluating many aspects of climate change.

Leaders in oceanography have counseled the scientific community about the importance of moving from diagnosis to prognosis. Others have written about prognosis involving more than simplistic one solution answers, but using scenarios to constrain solutions and build-in flexibility. Jim Cloern is one of the few leaders with the skills to really do these things and he has done them and is teaching us all how to do them in the Bay-Delta. While most scientists take the easier path of focusing on small more manageable questions, or using simple approaches to address broad problems, CASCaDE under Jim's

leadership addressed the broadest, most complex problem we face in managing the Bay-Delta, with complicated tools rooted in the best that science has to offer. I cannot stress enough the courage it takes to combine depth and breadth in addressing a subject of great relevance to society and the difficulty and persistence it took to make such a study a success.

Finally, Jim is dedicated to public communication of the science he leads. His project's San Francisco Bay website was far ahead its time in both quality and sophistication. The website reflected Jim's early recognition that this new tool offered heretofore unprecedented opportunities to communicate to the public. He drove creation of the film "Delta Revival" for the same purpose; recognition that science does not come free. He recognizes and strongly believes we owe the public clear communication about our work at the very least.

With a career this diverse, how can anyone but Jim's closest colleagues and friends really see the full scope of all he has accomplished and the impacts he has had? Those of us who have been with him through this time have seen and felt those impacts. We recognize that there is no one who could be more truly deserving of a career award like Brown-Nichols award. Jim Cloern has the unique personal attributes of being a great communicator and a brilliant scholar while at the same time a great listener. He is a serious scientist but lots of fun. Enthusiasm, fascination with new ideas and a tireless demand for excellence from those around him characterize everything I have seen Jim do. Jim has consistently contributed to advancing new, creative solutions to our technical problems in environmental science and water resources. More important, he has advanced the state of how we address those problems. His influence on others is extensive and his impact strong. His mentorships are many and expand the scope of his contributions, directly and indirectly. He is strongly deserving of this prestigious award.

Sincerely,

Samuel N. Luoma
Research Ecologist
John Muir Institute of the Environment
University of California, Davis