

Dr John Annala
Scientific Committee Chair
Commission for the Conservation of Southern Bluefin Tuna
PO Box 37, Deakin West
ACT 2600 Australia
July 16, 2014



Dear Sir:

Regional fisheries management organizations have the recognized responsibility and capacity to manage fisheries exploiting global tuna stocks. The CCSBT has adopted a scientifically tested, adaptive rebuilding strategy that is recognized globally as a leader in effective international management. As you are aware, the computations supporting the adaptive management procedure adopted by the Commission and the simulation-testing framework used to set the MP have been coded using the open-source software, ADMB. The maintenance of this software has relied on the initial funds provided by a Moore Foundation grant in 2007. Subsequent support has been from annual contributions in excess of US\$200,000 from the United States of America through the National Oceanic and Atmospheric Administration (NOAA). NOAA has indicated they would like to continue to support the endeavour; however, there is no guaranteed long-term commitment.

Attached is some background on the ADMB project. In summary, the ADMB-Foundation is seeking support for the three main activities: 1) development of the open source project to ensure the code remains viable as computer software and hardware evolve, 2) the transition to new coding standards (C++ 11 compliance standards) so the software will continue to work with modern compilers, and 3) outreach, where training and workshops would support the next generation of ecosystem and fisheries stock assessment modellers. Further to these are activities implementing state-of-the art libraries for random-effects and spatial models and making better use of code parallelization common on most modern computing platforms.

The ADMB Foundation is seeking on-going commitments of US\$10,000 per annum from institutions benefiting from the ADMB software over the next 5 years. A commitment of this order from the CCSBT, and other RFMOs in similar situations, would help ensure continued availability of the ADMB software to support the Commission's mandate to recover SBT stocks as well as enable further improvements in assessments and management performance. Larger grants would of course welcome for further development projects.

We therefore respectfully request that the SC consider recommending that the Commission support this important and worthwhile endeavour.

Sincerely,

Steve Martell ([Martell.Steve@gmail.com](mailto:Steve.Martell@gmail.com))
ADMB Foundation Treasurer

ADMB Open Source Project

General Prospectus

What is the ADMB Open Source Project?

Automatic Differentiation Model Builder (ADMB) is a software tool for developing integrated statistical models of complex systems. ADMB software is free, open source, and available for most operating system platforms. Globally, it is fastest and most accurate software in use for non-linear statistical models. The ADMB Project was created and is supported by the non-profit [ADMB-Foundation](http://admb-foundation.org/).

Problem statement

Solutions to many of the problems of the Twenty-first Century, such as climate change and resource management, depend on analysis of data from the natural world. Understanding real-world data is heavily reliant on analytical approaches to interpret complex and increasingly large datasets. The ADMB Project provides the tools and support for developing these approaches, for instance, ADMB is the most widely used software platform in fisheries stock assessment. The software was originally proprietary, developed by Dave Fournier in the late 1980s. The rights to ADMB were purchased in 2007 and formed the basis of a successful open-source project. The generous funding from the United States National Oceanic and Atmospheric Administration for the maintenance and development of this software is nearing its limitations, and we are now seeking additional funding for the ADMB-Foundation to continue to maintain ADMB and support its further development. The ADMB Project currently relies on a small group of dedicated volunteers to implement new features, fix bugs, and improve documentation.

Long-term goals of the ADMB Project include

- ensuring the software meets the latest coding standards for evolving operating systems (e.g., Windows 8, Mac OS X, and Linux) and compilers,
- incorporating new developments in numerical computing to further improve performance of ADMB applications,
- to support, maintain, and expand the active group of volunteer developers who generously volunteer their time to contribute to the project,
- support the open-source project such that the software continues to be freely available for individuals, academics, agencies of all disciplines,
- support new open-source initiatives that promote the use of non-linear statistical models based on fast and accurate software.

Why is it important to support the ADMB project?

The aims and objectives of the ADMB-Foundation are to:

1. Advance the [ADMB project](#) for improving data analysis and non-linear statistical modeling.
2. Act as an official voice for the ADMB-Project, providing means of communication with the press, commercial and noncommercial organizations interested in the ADMB software,
3. Coordinate development and promote use of ADMB

To achieve these objectives, the ADMB Foundation relies on one paid full-time programmer plus a small group of world-renowned resource scientists (core developers) who volunteer their time and expertise. These individuals maintain the source code, develop new features and statistical methods, and make the code available for free use on a wide variety of computer platforms. Collaboration between project staff and core developers is on-going and occurs continuously. Additionally, a series of developer annual or biannual workshops are used to address new issues, recruit and train new developers and develop working groups to address specific goals. ADMB essential for the future management of fisheries and other natural resources; and the use of ADMB in other disciplines is also growing. There are really no comparable tools available to conduct complex analyses using integrated non-linear models. Without continued maintenance and feature development of this software, the current software would become unusable as computing hardware and software evolve in time.

Looking into the future, there will be an increasing demand for natural resources, exacerbating resource conflicts and the problems of understanding the relationship between climate change and resources use. These changes will increase the demand for analytical support and the production of models that attempt to integrate large amounts of information to try and understand out systems will respond to alternative management options. AD Model Builder is an essential tool for building such dynamic models that allow for exploration of alternative policy options.

Need for financial support

ADMB-Foundation supports three major components: (1) is maintaining the open-source project, (2) research and development in advancing non-linear statistical models and improving methods for efficient numerical computing, and (3) outreach and training for post-secondary and government agencies, and industrial research.

Maintaining the open source project

Annual projected costs for maintaining the open source project and collaborations among developers is \$150,000 per year for the next 5 years.

Research and development

Annual projected cost for research and development and ensuring the code will evolve with modern compilers is \$170,000 per year for the next 5 years.

Outreach and training

Annual projected costs for outreach and training is roughly \$128,000 per year for the next five years, assuming 2 5-day course per year in North America, Europe, and developing countries.

Maintaining the open source project

The ADMB-Foundation currently supports the maintenance of ADMB software project and also provides support for outreach programs and continued development of the software. Maintenance involves routine testing of code changes on all major computing platforms. Outreach involves recruiting and training core developers who can contribute to the code repository and help educate and train new ADMB users. Annual projected costs for the support and maintenance for the open-source project is estimated at \$250,000 per year. Costs include salaries and support contracts, fringe benefits, and travel support for international scientists to attend the developer and training workshops.

Research and Development

AD Model Builder has enjoyed being at the forefront on computational efficiency and accuracy for over two decades, and is the most widely used software development tool for fisheries stock assessment around the globe. In order to maintain this standard of excellence, it is necessary every 5-7 years to carefully re-engineer the software libraries to address the ever-changing computing technologies and changes to operating system software.

Outreach and Workshops

The ADMB-Foundation places a high priority on training new ADMB users and reaching out to post-secondary institutions to incorporate the use of ADMB in their statistics programs and conference based workshops. Much of the training is at the graduate student level, and the majority of the effort has focused on Colleges and Universities with strong fisheries programs. Recent efforts have also targeted more ecology conferences and statistical conferences. The ADMB-Foundation has also had a great presence in many of the Regional Fisheries Management Organizations. Access to knowledgeable educators in ADMB is limited and the Foundation would like to build more capacity for teaching and provide more opportunities. Currently all of the instruction is carried out by volunteers who are employed by government agencies, RFMOS, and Universities. The ADMB-Foundation is seeking support to provide more training opportunities for students, agencies and industry resource analysts. Typical ADMB training workshops are 4-5 days in duration, and it is common to run an introductory course and advanced course