

ADMB Meeting

**NMFS, Southwest Fisheries Science Center
La Jolla, CA, USA
March 29-31, 2010**

Introduction

Meeting documents are available at <http://ADMB-project.org/community/ADMB-meeting-March-29-31>. The Agenda was adopted (Appendix 1) and John Sibert agreed to chair the meeting, which had a total of 17 participants (Appendix 2).

John Sibert summarized the history of ADMB project, the ADMB Foundation, the current status of the project, the work in progress, and the project's achievements (Appendix 3).

The primary goals of the meeting were to

- (1) recruit active participants to do the work of the ADMB Project with a discussion of **ongoing activities**,
- (2) **identify priority activities** for 2010-2012, and
- (3) **create a sustainable organization** to maintain and develop ADMModel Builder.

The organization of this report reflects these goals.

The local organizers, Ray Conser and Mark Maunder, are thanked for their hard work providing an excellent venue and arrangements for the meeting.

Ongoing activities

Documentation

The online documentation system was presented by John Sibert with details on how the Doxygen system works. The issue of hiring someone to complete this work was discussed as was the alternative to have users contribute more regularly. Alternatives might include a wiki but with Doxygen the ability to document directly in code and commit to the source code was preferred. The group noted that any new code should require Doxygen comments (but that not all old code needs documentation). The need to have a list of what needs to be documented was noted and that a higher level of understanding is required to do documentation. A dedicated workshop on code and how to document was suggested and such a workshop could also teach people how to change code. Progress may be more quickly achieved by hiring a contractor or graduate student to spearhead this work. A "how to" was suggested for illustrating the steps needed to add a new function, including naming conventions, how to document, and how to submit code to repository. A list of commonly used functions taken from general models like Coleraine, Stock Synthesis, and ADMB user manual examples has been compiled by Arni and these functions are highlighted as keywords in the IDE.

It was noted that the LaTeX macro used for the updated (corrected) main documentation has been completed and will be sent soon.

The group discussed the "ADMB Getting Started Guide". The group noted that this is an excellent contribution (written by Kiersten Major-Henderson). The discussion about next steps, namely additional chapters that reach out to fields other than fisheries, focused on improving current modeling approaches widely used in those fields. Jim Bence volunteered to collate and summarize comments from meeting participants on the current guide and send them on to Kiersten. Comments should be submitted to him by

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Over 20 books have been published on applications of the R language. It was suggested that having some ADMB applications published in a similar way would be useful. The meeting participants compiled a list of priorities for work on ADMB documentation (Table 2).

Training

Most people involved in directing past workshops were in attendance at the meeting, with perhaps 5 more not in attendance. Anders Nielsen discussed the format of the last 3 classes conducted in Santa Barbara, San Sebastian, and Copenhagen. The 2-day introductory format was discussed relative to more common 4-day versions. The group noted an expanding pool of instructors. Actual model building and statistics parts are important and a lot of time is spent to that. Online instruction provides some potential advantages in that such courses could be offered without travel. Applications such as gotomeeting allow an instructor to demo and take over a student computer to illustrate how to do things. The use of practical examples (brought by participants) was generally considered a good idea. Typically, about 10-20% of participants go on to use ADMB after the class. The typical wide range of abilities of participants makes it important to have assistants to help the lead instructor. Requests are made frequently and a calendar of courses and events should be made available. The need for someone to prepare materials for workshops was noted.

The group discussed the utility of creating a course for dedicated Bugs users and the potential that NCEAS would coordinate this effort.

Integration with other software

Mark presented the different projects that interface R to ADMB and commented on ADMB2r, PBSADMB, R2ADMB from Ben Bolker, scapeMCMC (from Arni), Google school of code (<http://code.google.com/soc/>), and FLR. The group commented on their personal experiences in adopting ADMB as a resource. The link to professors was highlighted as a popular theme and of course with colleagues and outreach. The group discussed which users use both winbugs and ADMB. There didn't seem many who did this that we knew of. However, using R and/or excel with ADMB was quite common. It was concluded that developers working on the ADMB project should keep the focus on ADMB and welcome developments and collaboration from R or other projects.

ADMB promotion and non-fishery applications

An article is needed that displays the capabilities of ADMB in comparison to other non-linear modeling software or packages. A broader user base is considered important. The journal of Statistical Computing (<http://jscs.statjournals.net/>) was proposed as an outlet for such an article (an additional list of <http://www.statsci.org/compjour.html>). Applications that are complex enough to show the benefits of ADMB need to be identified. The meeting noted the need to draw people from outside of fisheries so that the benefits of integrated modeling approaches can be realized. For example, oceanographers may benefit from the use of ADMB.

NCEAS facilitates working groups, and fellows there could be appointed to assist other working groups with the use of ADMB for their projects. Also, a proposal to have an NCEAS working group "evaluating and improving software for nonlinear statistical models" was recommended. Folks from wildlife and other fields would be encouraged to participate and collaborate on developing the proposal. In particular, users/educators using Bugs and/or R would be encouraged to attend. The focus should be on ways of improving statistical inference. Mark Maunder and Jim Regetz volunteered to coordinate this activity.

"Generic" code replacement

This activity is continuing with the hire of a full-time programmer (Derek Seiple) at the University of

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Hawaii in February 2010. This position is a one-year appointment funded by NOAA through JIMAR.

Maintaining source code on multi-platform testing

The source code is maintained on a secure [Subversion](#) repository. Authorized users can check out working copies of the code and commit modifications. An automated process, [Buildbot](#), detects changes to the repository and supervises compilation and testing of the libraries for a variety of compilers, operating system and hardware targets.

The Buildbot enables continuous integration and testing, but more tests would be desirable to help ensure that all parts of the ADMB code are checked. Developers who introduce new capabilities to ADMB should also supply example template files for testing.

The repository and Buildbot are currently maintained by Johnnoel Ancheta.

Outreach

Outreach activities were presented, notably the status of Newsletter production and the disbursement of prizes for recognizing excellence in modeling (e.g., http://ADMB-foundation.org/?page_id=35). In order to attract new users, the importance of presentations at non-fish related conferences was noted.

Additionally, workshops with broader non-fisheries scope (e.g., that done at NCEAS) are considered important. The group also discussed potential benefits of expanding the participant base for future general meetings and related activities, and that some meeting participants might be able to suggest such people.

Website administration

The group discussed the current state of website design and compiled a list of items needing attention (see Table 3). Overall the design needs work (e.g., comparing with other pages that are attractive. During the workshop we looked at: <https://kepler-project.org/> and <http://www.r-project.org/> but it was agreed a [broader spectrum of sites should be reviewed](#)).

Priority activities for 2010-2012

As ADMB is an open source project it largely evolves in the direction where the users are taking it, but the discussion of the benefits and complexity of the different tasks was very helpful to the group.

Summary of previous discussion

Mark presented the results of discussions held on further developments for ADMB. These were as follows (in no particular order): 1) Create a “count model” package, which is a subject Dave is interested in, as it add things that are hard to do outside of ADMB (e.g., modeling overdispersion). 2) Streamline interface between ADMB and R, share libraries (dll), coordinate with proposed R project “Google summer of Code” initiative. 3) A translator from winBugs to ADMB, which would make it easy for winBugs users to try ADMB, give instant access to winBugs example collection, and allow ADMB models to be specified in the simple model language. The graphics for current winbugs users probably important in considering switching to ADMB. 4) Link external high-performance matrix libraries (e.g. BLAS) into ADMB for evaluating the quadratic form used in the multivariate normal distribution, which is often the bottleneck in a certain class of often used random effects models. 5) Parallelization of ADMB is becoming increasingly important, as even laptop and desktop computers come with several cores. 6) Two separate MCMC improvements were discussed. Converting from the current use of variables including derivative information to variables without could give up to a 3 times speed improvement. A preliminary version of the hybrid MCMC algorithm developed by Hanson (2002. Los Alamos Report LA-UR-02-4105), which uses derivative information, needs documentation, testing, and refinements.

In addition, alternative ways to read in data and parameter settings (coupling, bounds, phases, and initial values), without recompiling are desired.

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The assembled group discussed recent developments in optimizer algorithms including the limited memory quasi-Newton optimizer, which is a recent, but still under testing, addition to ADMB.

Priorities for technical developments

These are outlined in Table 1.

Table 1. Priorities for technical development of Autodif/ADMB

	Topic	Description	Individuals
1.	Parallelization	Internal ADMB part, and user control part, with a “howto”	Dave and others TBD
2.	Hybrid MCMC	Fully implement and document this capability	Dave, Derek
3.	Matrix library improvement	Linking external (large) matrix library to improve random effects library	Anders. Kasper
4.	MCMC streamlining	Model conversion to constant objects	Dave
Additionally, the following lower priority activities were identified:			
	Topic	Description	Individuals
5.	Winbugs to ADMB parser	Adding more functions for densities, prior types etc.	Mark, Anders (Millar? Student?)
6.	Design matrices	Add capabilities for creating design matrices	Dave, others
7.	Data alternatives	XML may be a useful approach to adding robustness between datafiles and DATA_SECTION, Netcdf capabilities?	
8.	DLL	FLR group to continue improving DLL	L. Kell
9.	Flag/switch class	Simplify the use of control and MCMC files, perhaps MFCL-like object capability	Dave, Arni, Pierre
10.	Code tuning, debugger	Profiling tool to improve code-e.g., where adjoint code may best be applied. Gcc profiler, memory usage. Develop example howto	Hans, Johnnoel, Jim I., Ray Conser
11.	2 nd and 3 rd derivative	Easy implementation of these to facilitate adjoint code.	Dave, Hans
12.	Developers workshop	To train more people on how to write and contribute code to Autodif/ADMB	Johnnoel, Steve Martell

Priority activities for documentation

Activities for documentation are presented in Table 2.

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Table 2. Table of priority activities for documentation of ADMB.

Item	Description	Individuals
1. FAQ page	Include a FAQ page	Arni, Ian Taylor
2. Getting Started Guide	Coordination of Reviewing Apply new LaTeX macro when finalized. Develop an example of applying macro	Jim B. Kiersten (NCEAS) John Sibert
3. API documentation (Doxygen)	Developers should contribute to documenting existing functions using SVN repository. New code must include API documentation.	Derek, John
4. MCMC documentation	Document MCMC algorithm details. Additionally, an example read and write binary files from R and for user-supplied covariance in MCMC (perhaps for newsletter)	Jon B, Anders
5. Howto for new code	How to incorporate code into the Autodif library including submission to the repository	Johnoel, Anders
6. Examples	Facility to submit examples to site	Hans
7. tpl2cpp code modification	Example howto to modify or add (needs help). Flex, and other tools needed.	Dave, Arni
8. Details of quasi-Newton search method	This would involve specifying the details of line-search, step-size determination etc	???

Create a sustainable organization to maintain and develop ADMB

The ADMB Foundation is loosely modeled after the R Foundation. The current "ordinary members" of the Foundation are Mark Maunder, Anders Nielsen, and John Sibert. As stated in its bylaws, "The objectives of the ADMB Foundation are to (a) Advance the ADMB project to provide free and open source software for data analysis and non-linear statistical modeling; (b) 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; (c) coordinate development and promote use of ADMB; and (d) hold and administer the copyright of the ADMB software and documentation." There was extensive discussion of whether the Foundation should be enlarged. It was concluded that the size and role of the Foundation are appropriate to support the ADMB Project at this stage of the Project.

The absolute minimum essential activities of the Project are maintenance of the ADMB source code repository and automated multiplatform compilation of the source code into libraries. A rough estimate of the cost to sustain this activity is approximately US\$100,000 per year. The National Oceanic and Atmospheric Administration currently supports the Project through 2010 at this level via a grant to the Joint Institute of Marine and Atmospheric Research and the University of Hawaii. Funding for 2011 and beyond is uncertain.

Meeting participants discussed options for longer term funding. The options include other agencies concerned with resource management such as fisheries agencies outside of the USA, regional fisheries management organizations, FAO and the European Union. Charging fees for ADMB training courses was rejected as a general source of funding. Private foundations that have funded research dependent on ADMB (e.g., Lenfest, Pew, ...) should be approached. The ADMB Foundation has a category of membership for sponsors, "supporting members", that could be offered to private funding sources. The meeting noted that the R Foundation also has a supporting member category that includes several banks, Shell, AT&T and medical research institutions and academic statistics departments. Fundraising is a major task and will take a large commitment by an individual or individuals.

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Meeting participants emphasized that sustainability of ADMB requires more than simply re-compiling the code as compilers evolve. New capabilities need to be included both to extend statistical functionality and to exploit the capabilities of new computer hardware.

The ADMB Foundation board consists of 3 people. Enlargement of the board was discussed, but no conclusions were reached.

Meeting participants discussed the relationship between the ADMB Project and the National Center for Ecological Analysis and Synthesis. There may be mutual advantages to strengthening links to NCEAS in the future. The participants recommended that NCEAS would benefit by promoting the ADMB project as one of their scientific products (presently there is very limited content on the page: <http://tinyurl.com/yh49b8l>).

Rather than constituting a formal ADMB Project Steering Committee, the meeting participants agreed to act as an informal advisory group. However, due to broad participation by NMFS (from each center) future committee composition may include proportionately fewer NMFS people.

The group discussed the future need for a designated project coordinator. This could be a University or an agency position. The position would be designed to coordinate the project and relieve some of the tasks identified above. It is important that if a person is identified and funded, that the individual would be vetted by the group (to ensure appropriate motivation and enthusiasm). As the project grows, the need for a dedicated coordinator will likely increase.

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Table 3. Other activities that were identified during the meeting.

Activity	Description	Individuals
Training coordinator	Develop calendar, coordinate requests with instructors, maintain training section of website	Jim Bence
Website administration	Site redesign- e.g., reduce number of tabs (1-3?) Left panel for navigation	Allan Hicks, Jim Regetz
Website section responsibilities:		
	Include FAQ	Arni Magnusson, Ian Taylor
	Editing tools	Arni Magnusson
	Coursework	Jim Bence
	Examples	Hans Skaug
	Documentation	John Sibert, Jim B.
	Community	Mark Maunder
	Source code	Johnoel
Funding		
	Fundraising coordinators	Mark Maunder, Steve Martell
	Core project maintenance funding	Rick Methot
Outreach coordinators	Broaden applications to other fields Scholarship/prize coordination Highlight courses Track applications of ADMB (papers, applied work) Newsletter Community page (web)	Mark Maunder
Development coordinator	Implement priorities, Oversee code replacement project (with Derek Seiple)	John Sibert (presently)
Winbugs translator	Ensure steps to develop are reasonable	Mark, Anders, R Millar?

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Agenda

1. Introduction and meeting goals (JS)
 - a. Create a sustainable organization to maintain and develop ADMB
 - b. Recruit active participants to this work
 - c. Identify priority activities for 2010-2012
2. Approval of agenda, appointment of Chair and rapporteurs (JS)
3. Status of ADMB Project and progress to date (JS)
4. Foundation finances and funding prospects (MM)
5. On-going ADMB Project tasks (JS)
 - a. Website administration
 - b. Source code maintenance, multi-platform compilation, and testing (JCA)
 - c. "Generic" code replacement
 - d. API documentation
 - e. Training workshops (AN, JI)
6. Identification of new ADMB Project tasks (MM)
 - a. New capabilities for ADMB
 - b. Results of ad hoc meeting
7. Outreach
 - a. Newsletter
 - b. Prizes
 - c. Conferences and workshops
8. Training
 - a. An introductory guide to ADMB—course material
 - b. Coordination of courses, examples set
9. Bugs to ADMB translator
10. R
 - a. DLL—FLR
 - b. PBSADMB (Schnute)
 - c. ADMB2R (Prager)
 - d. R2ADMB (Bolker)
 - e. Google summer of code (Nash)
11. Development
 - a. Parallelization
 - b. Hybrid MCMC
 - c. Constant objects in MCMC
 - d. General count model
12. Funding sources
13. ADMB project and Foundation structure and functioning
 - a. New Foundation members
 - b. New ADMB board members and officers
 - c. Proposal for a coordinator of the ADMB project
14. Prioritize new tasks
15. ADMB Foundation Board Meeting

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Appendix 2. Participant list

List of people who may want to (or do already) contribute to the ADMB Project, compiled in La Jolla 29-31 March 2010. The list of people contacted to attend the meeting:

Name	Email
Alex da Silva	alexdasilva@iattc.org
Allan Hicks	Allan.Hicks@noaa.gov
Anders Nielsen	anders@niensensweb.org
Arni Magnusson	arnima@hafro.is
Brian Linton	brian.linton@noaa.gov
Christina Show	Christina.Show@noaa.gov
Hans Skaug	Hans.Skaug@math.uib.no
Jim Bence	bence@msu.edu
Jim Ianelli	Jim.Ianelli@noaa.gov
Jim Regetz	regetz@nceas.ucsb.edu
John Sibert	sibert@hawaii.edu
Johnoel Ancheta	johnoel@hawaii.edu
Jon Brodziak	Jon.Brodziak@noaa.gov
Mark Maunder	mmaunder@iattc.org
Ray Conser	Ray.Conser@noaa.gov
Richard Methot	Richard.Methot@noaa.gov
Steve Martell	s.martell@fisheries.ubc.ca
- Andre Punt	aepunt@u.washington.edu
- Ben Bolker	bolker@ufl.edu
- Bill Clark	Bill@iphc.washington.edu
- Chris Legault	clegault@mercury.wh.who.edu
- Clay Porch	clay.porch@noaa.gov
- Dave Fournier	davef@otter-rsch.com
- Iago Mosqueira	Iago.Mosqueira@cefas.co.uk
- Jon Schnute	Jon.Schnute@dfo-mpo.gc.ca
- Kasper Kristiansen	kkr@aqua.dtu.dk
- Mark Schildhauer	schild@nceas.ucsb.edu
- Pierre Kleiber	pkleiber.hi@gmail.com
- Stephanie Hampton	hampton@nceas.ucsb.edu
- Travis Brenden	brenden@msu.edu

- were unable to attend.

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Appendix 3. Status of ADMB project

Project Milestones

- December 2007 – Grant from Moore Foundation to NCEAS
- October 2008 – University of California purchase rights to ADMB from Otter Research
- December 2008 – ADMB binaries on line for public download on code.google
- April 2009 – Over 2000 downloads of binaries
- May 2009 – Preliminary source code release
- December 2009 – Complete source code available
- March 2009 – ADMB supported on all major computing platforms

ADMB Foundation Milestones

- August 2007 – Incorporated in State of Hawaii
- December 2008 – 501(c)(3) Status from IRS
- May 2008 – Receives start-up funding from several fisheries organizations (IATTC, IPHC, AZTI)
- June 2009 – David Fournier receives AFS Ricker award
- May, June 2009 – Sponsors student awards at Tuna Conference and AFS
- August 2009 – Sponsors introductory training workshops in Spain and Denmark

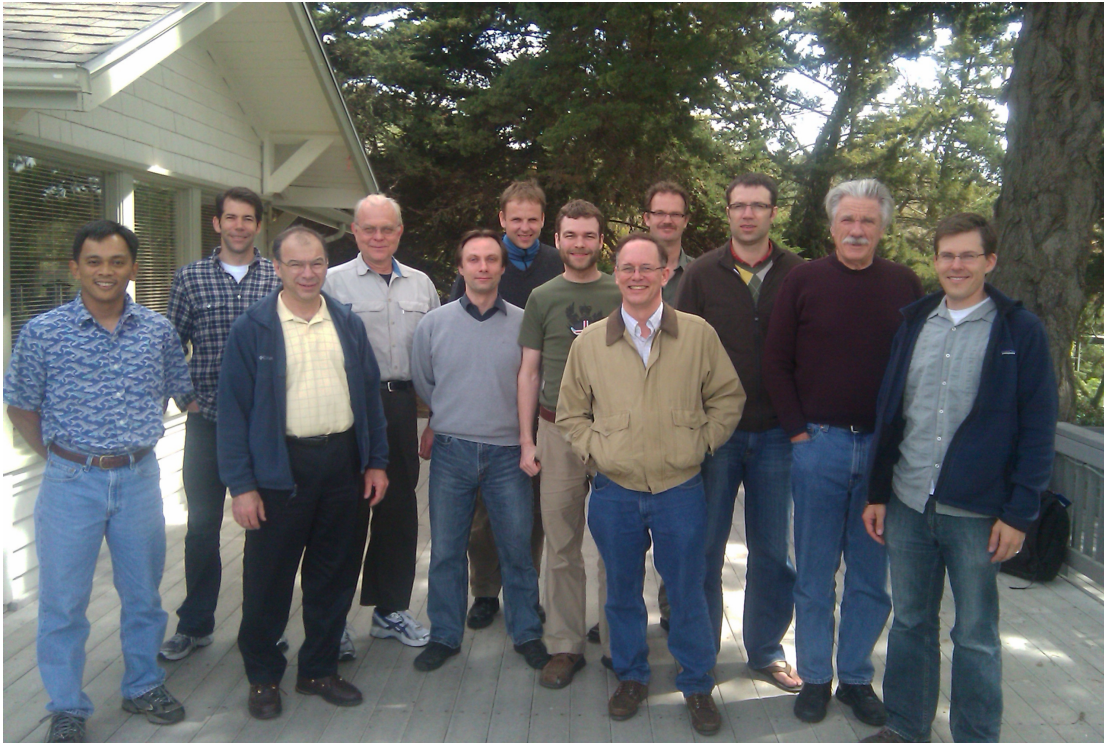
Current Status

- ADMB binaries freely available for all major computing platforms: Windows, Cygwin, Linux, MacOS, Sun/SPARC
- ADMB supports all major compilers: Microsoft, Borland, Gnu, Intel
- Automated installation procedures for Windows and MacOS
- Complete source code available (you can eat your own dog food)
- Graphical user interface for template development (emacs based)
- Streamlined tpl compilation scripts

In Progress

- Generic code” replacement
- Revisions to existing documents – manuals reformatted in a uniform style, proofread and correctly indexed; new LaTeX document style class
- “Cheat Sheets”
- New “ ADMB Getting Started Guide”
- API documentation
- Websites

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Meeting participants

From left to right: Johnoel Ancheta, Allan Hicks, Rick Methot, Ray Conser, Anders Nielsen, Hans Skaug, Arni Magnusson, Jim Bence, Mark Maunder, Steve Martell, John Sibert, and Jim Regetz. *Participants Not pictured: Jon Brodziak, Christina Show, Alex da Silva, Brian Linton, Jim Ianelli. photo by J. Ianelli.*