R, knitr, ADMB and Reproducible Research in Fisheries Science

Quantitative Fisheries Center, Michigan State University

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Outline

Workshop Objectives

- introduce concept of reproducible research
- introduce software tools and methods of work that are consistent with reproducible research
- provide an understanding of what each tool is doing and how they fit together
- provide worked examples that can be adapted to real-world analysis

by the end of the workshop you will know how to:

- automatically create pdf reports and presentations from analysis done in R and admb
- use version control to:
  - reset working directory to any previous state
  - reproduce any previous report
  - confidently make changes and updates to your code base
  - seamlessly document changes to your analysis over time
  - robustly backup or distribute your analysis

Workshop Approach

- incrementally introduce tools and basic usage
- presentations and discussions followed by exercises
- applied - lots of examples
- most examples incrementally build on earlier examples
- some bonus examples:
  - presentations
  - markdown to htlm
  - emacs org-mode/babel

Software requirements

- installed and basic knowledge of
  - AD Model Builder
  - R
- installed:
  - LaTeX
  - sweave/knittr
  - git
- Integrated Development Environment:
  - emacs with admb-ide, ESS, magit (see workshop configuration)

OR

- Rstudio, an admb-ide, and git-gui

Course Materials

- working environment:
  - my public dropbox:

  https://dl.dropboxusercontent.com/u/69389312/workshop.zip
- presentations and examples
  - https://github.com/AdamCottrill/QFC_Workshop

git clone:

```
git clone https://github.com/AdamCottrill/QFC_Workshop.git
```

Workshop Outline

- Introduction
- Reproducible Research
  - the philosophy and basic ideas
- Verify Software Setup
- Introduction to emacs
  - exercises to introduce emacs and verify configuration
- Introduction to LaTeX
  - review basic structure of LaTeXdocument
  - create our first report

Workshop Outline (cont'd)

- Sweave/knitr
  - what is sweave? what is knitr?
  - create our first dynamic report
  - more complicated reports:
    - ★ multiple tables
    - ★ multiple figures
    - ★ references
    - ★ abstract
    - ★ presentation
    - ★ multiple chapters

Workshop Outline (cont'd)

- AMDB and knitr
  - communicating between ADMB and R
  - admb2R
  - ADMButils
  - reports using a model fit with ADMB
- Version Control
  - basic concepts
  - introduction to git
  - example using git and a scaa
  - Integrating git with knitr