# A consistent approach to the estimation of sustainable harvests of Patagonian Toothfish in Kerguelen Plateau & South-America

**Supervisors:**

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- Philippe Ziegler (AAD)
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# Chapter 1

# Background

**Objetives**:

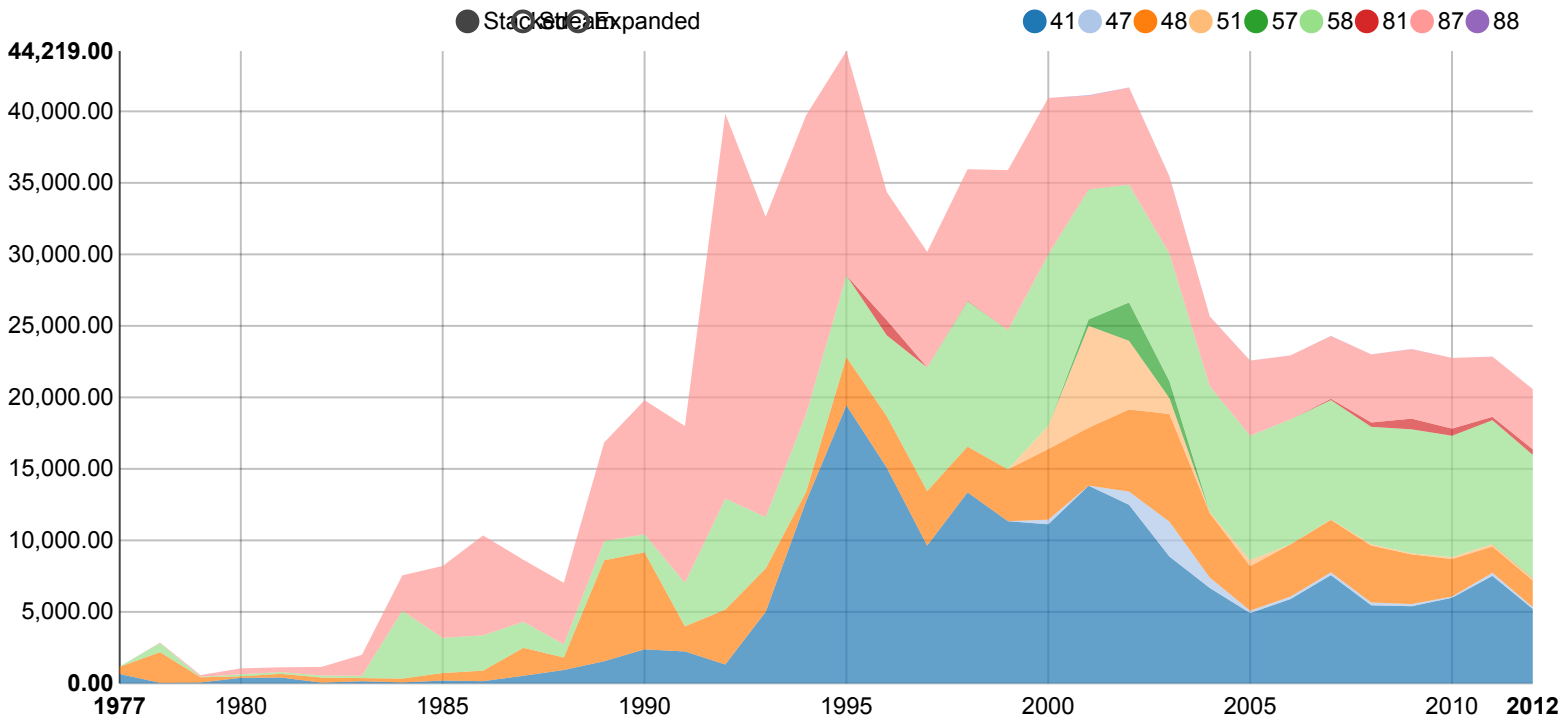
- to review, discuss and expound the different TOP management process implemented worldwide
  - Chapter 2
- to test the suitability of improve the actual modelling framework of TOP utilized in Kerguelen Plateau and South-America
  - Chapter 3 & 4
- to develop a robust MSE approach of TOP consistent with the modelling improvements identified in Kerguelen Plateau and South-America
  - Chapter 5
- to examine how the actual harvest policies implemented in Kerguelen Plateau and South-America influences the effectiveness of fishery management on TOP
  - Chapter 5

# Chapter 2

# TOP fishery in South-America: Drawing lesson from others Toothfish fisheries

- Second major catch area worldwide
  - *Brief description of fishery*
- Management mechanism appears untransparent and inconsistent
  - e.g. *Time line of **TAC's** criteria*
- Recently changes in Fishery Act
  - e.g. *by-catch is 'legal'*
- Explicit management objectives established in 2013 (Chilean case)
  - e.g. *MSY-based Reference Points. Pathways?*

# Catches by area



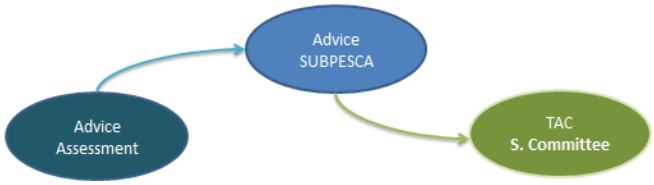

Zone 87 & 41 ----> South America

Zone 58 ----> Kerguelen Plateau

Zone 48 ----> South Georgia

# TAC in Chile

| Year | Source | Zone | BD/Bo | Criteria | Status | Advice Assessment | Advice SUBPESCA | TAC S. Committee | Landing UP |
|---|---|---|---|---|---|---|---|---|---|
| **2005** | IFOP | Unidad de pesquería | 23% | $F_{40}$ (10% risk) | Overfishing & Overexploitation | **2.200** | 3.000 | 3.000 | 1.796 |
| **2007** | IFOP | Unidad de pesquería | 21% | $F_{45}$ (10% risk) | Overfishing | **1.500-2.000** | 2.700 | 2700 | 2.358 |
| **2008** | IFOP | Unidad de pesquería | 20% | Status-quo SB | Overfishing | **1.250** | 2.910+90PI | 2.910+90PI | 2.883 |
| **2008** | CEPES | Unidad de pesquería | 29-36% | does not indicate | does not indicate | **3.585-4.200** | | | |
| **2009** | IFOP | Unidad de pesquería | 19% | Projection 8 year | Overfishing | **1.350** | 2.910+90PI | 2.910+90PI | 3.018 |
| **2010** | IFOP | Unidad de pesquería | 14% | Projection 8 year | Overfishing | **1.250** | 3.300+99PI | 3.300+99PI | 3.291 |
| **2011** | IFOP | Unidad de pesquería | 20% | Status-quo SB | Overfishing | **1.125-1.479** | 3.000+90PI | 3.000+90PI | 2.298 |
| **2011** | CEPES | Unidad de pesquería | 25% | does not indicate | Overexploitation | **3.000** | | | |
| **2012** | IFOP | Unidad de pesquería | 14% | $F_{MSY}$ (50% risk) | Overfishing | **1.000** | 3.000+90PI | 3.000+90PI | 2.051 |



# Progress Chapter 2

- **Documents** (70% Chile - 30% Argentina)
  - Progress 85% (see ftp (C:\Users\jcquiroz\Dropbox\CBA_bacalao))
- **Target Journal**
  - Marine Policy
  - Marine Resource Economics
  - CCAMLR Science (Paul's suggestion)
- **Milestone / First Draft**
  - January, 2015
- **Contingencies**
  - Insufficient Bibliography
  - Possible survey to stakeholders
- **Possible requirements**
  - Include others people as co-authors

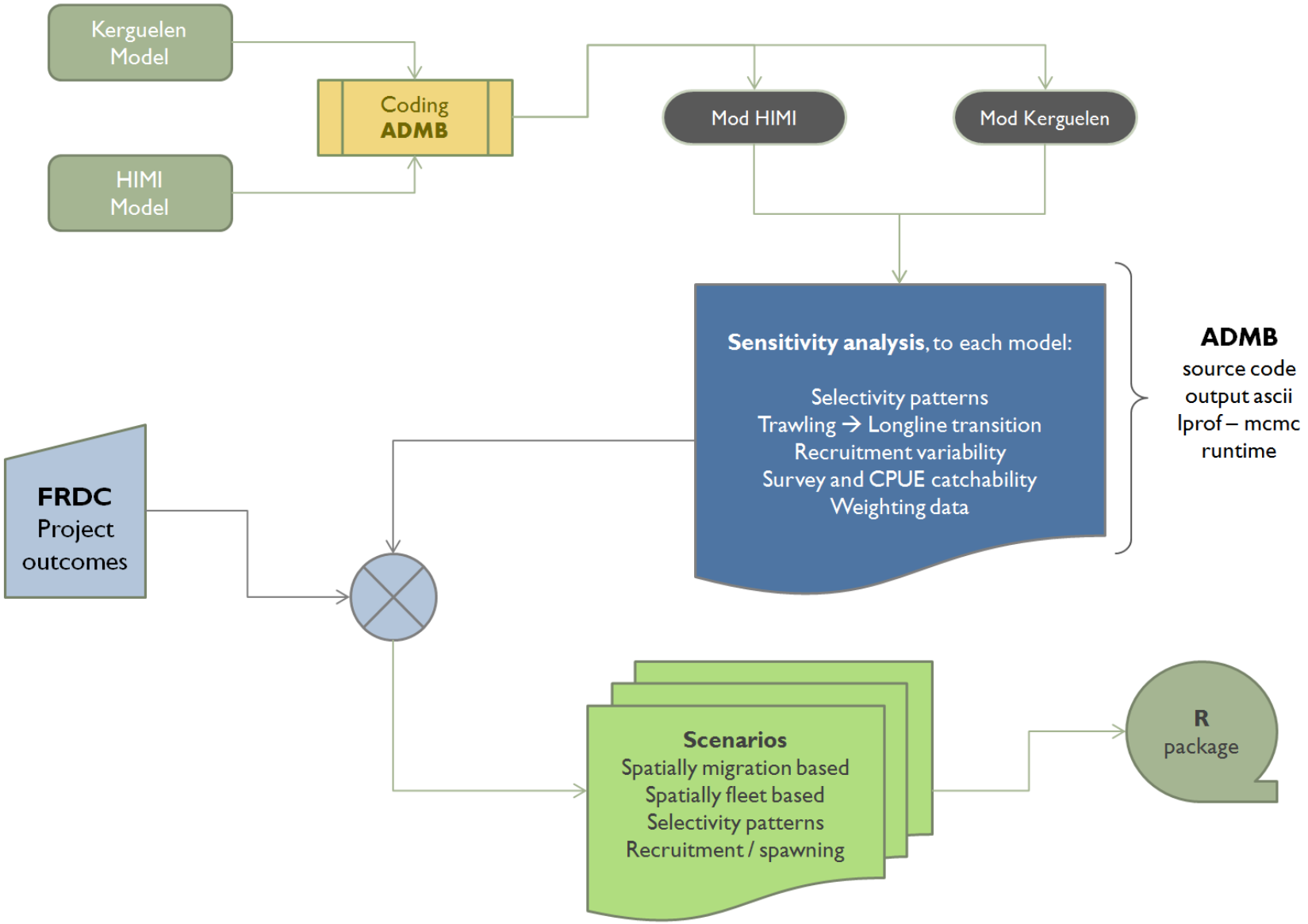
# Chapter 3

# Patagonian toothfish population dynamics in a spatially varying simulation framework: The case of Kerguelen Plateau

In this Chapter I will try develop tools to improve the theoretical population dynamic of Patagonian Toothfish on Kerguelen Plateau, particularly related to demographic traits under a spatially-structured base

The research should use a **scenario-based** analysis, avoiding parallel researches that come from FRDC project

Most of the inputs to setting the different scenarios should be derived from FRDC project


Kerguelen Model
HIMI Model
Coding ADMB
Mod HIMI
Mod Kerguelen
Sensitivity analysis, to each model:
Selectivity patterns
Trawling → Longline transition
Recruitment variability
Survey and CPUE catchability
Weighting data
ADMB
source code
output ascii
lprof – mcmc
runtime
FRDC Project outcomes
Scenarios
Spatially migration based
Spatially fleet based
Selectivity patterns
Recruitment / spawning
R package

# Progress Chapter 3

- **Coding**
  - Progress 10%
    - Some processes are finished (repo (https://github.com/jcquiroz/Southern-Hake-Fishery/blob/master/model_2011/model_msur.tpl))
- **Target Journal**
  - Plos One (California corporation, USA)
- **Milestone / First Draft**
  - November, 2015
- **Contingencies**
  - Largely depend on findings from **FRDC** project
  - Overreaching in this Chapter see Paul's Comments (comments_PB.pdf)

# Chapter 4

# Impact of misspecification model under a spatially-structured population, the TOP in South-America

A similar population dynamics

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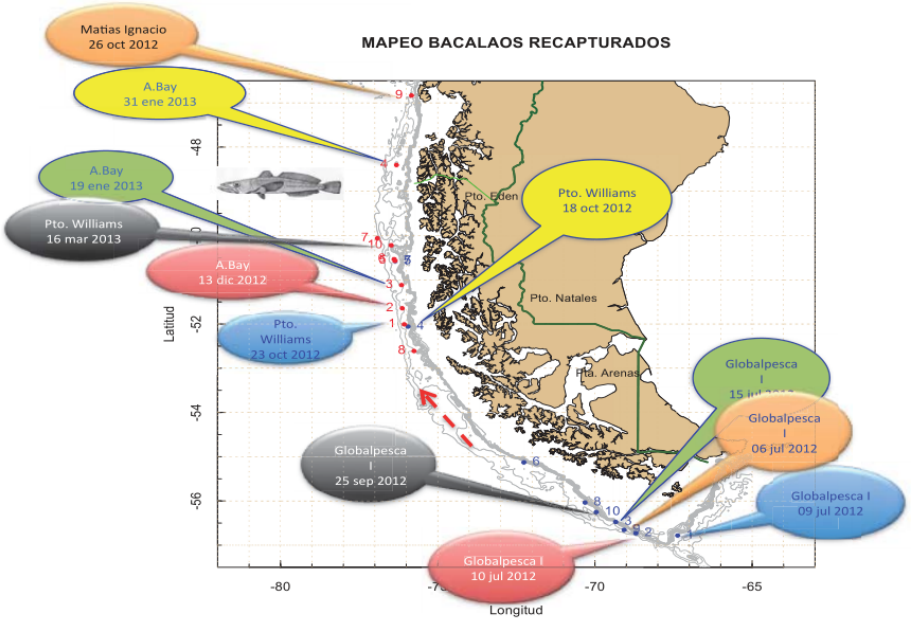
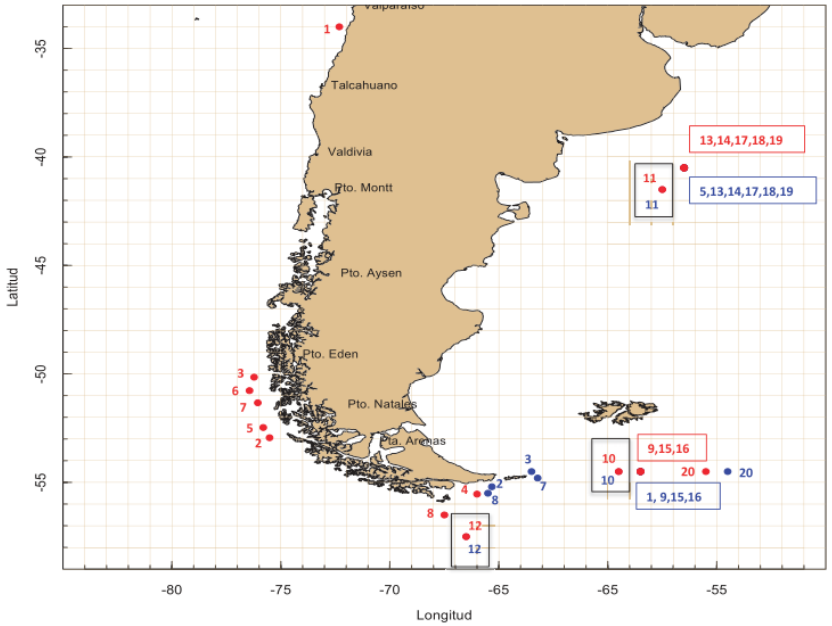
A similar population dynamics

## Chile (2012-2013)

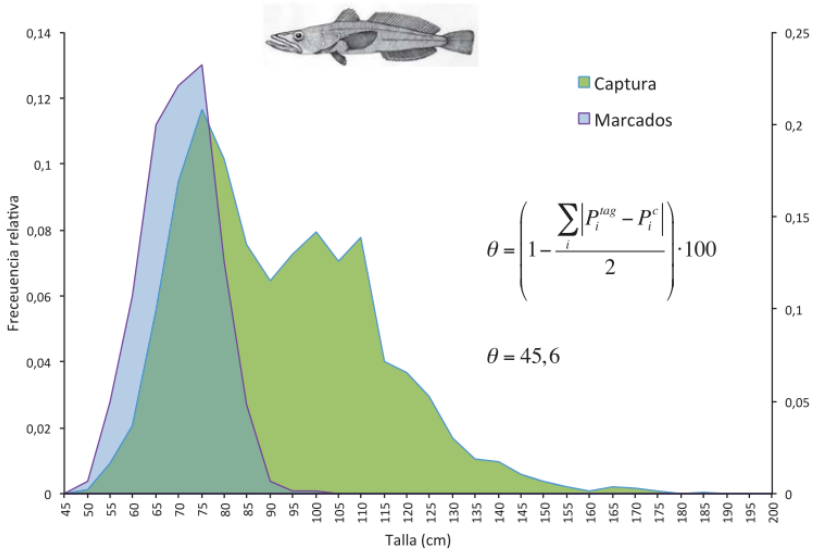



## Argentina (2004-2012)



# Many issues remain

- Tag size-overlap
- Voluntary process (enforcement is necessary)
- Spatial and temporal sampling coverage
- Artesanal fleet participation



# Chapter 5

# Bio-economic management strategy evaluation of TOP in southern and antarctic oceans

Still thinking about it !!, but a good start point maybe is Hoshino *et al.* (2010) ...

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*Marine Resource Economics*, Volume 25, pp. 265–280
Printed in the U.S.A. 

0738-1360/00 $3.00 + .00


**Economically Optimal Management Strategies for the South Georgia Patagonian Toothfish Fishery**

**Table 2**
Future Performance of Current and Alternative Management Strategies

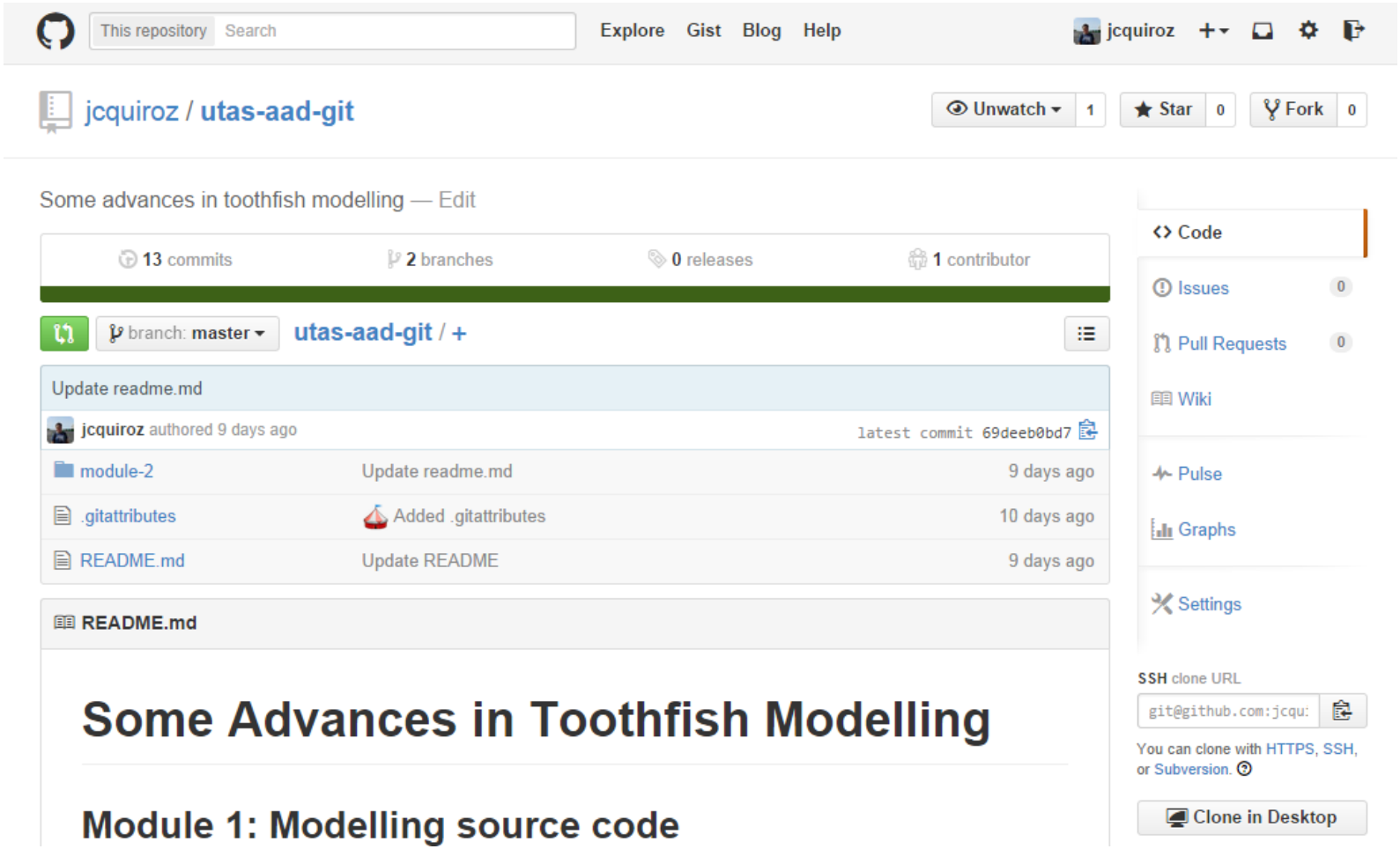
| Management | Effort Reduction Path | Sum of NPV in 35 Years ($ millions) | $p(B_{2042}>0.5K)$ | $p(B_t<0.2K)$ | Final Year CPUE |
|---|---|---|---|---|---|
| CCAMLR | NA | 245.9 | 50.0% | 0% | 0.22 |
| | Immediate | 229.2 | 99.7% | 0% | 0.26 |
| | Linear ($t^*$= 5.66 yrs.) | 245.9 | 99.7% | 0% | 0.26 |
| | Linear ($t^*$=35 yrs.) | 282.3 | 96.5% | 0% | 0.25 |
| Effort Control | Non-linear (v=0.538) | 245.9 | 99.7% | 0% | 0.25 |
| | Non-linear (v=0.075) | 272.4 | 98.0% | 0% | 0.24 |

Notes: NPV indicates net present value of annual profits, $p(B_{2042}>0.5K)$ is the probability that the final year biomass is greater than 50% of carrying capacity ($K$). $p(B_t<0.2K)$ is the probability that the biomass drops below 20% of K during the projection period.

# Support, coding and backup

# Control version & Reproducible Research

PhD Repository in **GitHub (https://github.com/jcquiroz/utas-aad-git)**



# LATEX based

Most of the writing outcomes will be based in Latex. Nevertheless Microsoft version files will also be stored. **Why use LATEX?** High typographical quality, time-saving, clean & order.
E.g.: Thesis Template (thesis.pdf) (Thanks to Paul for sharing his Thesis template)

# Thank You!!!