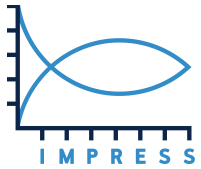

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA

Rfishpop: A new R-package for the analyses of the fisheries population under uncertainty

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Introduction

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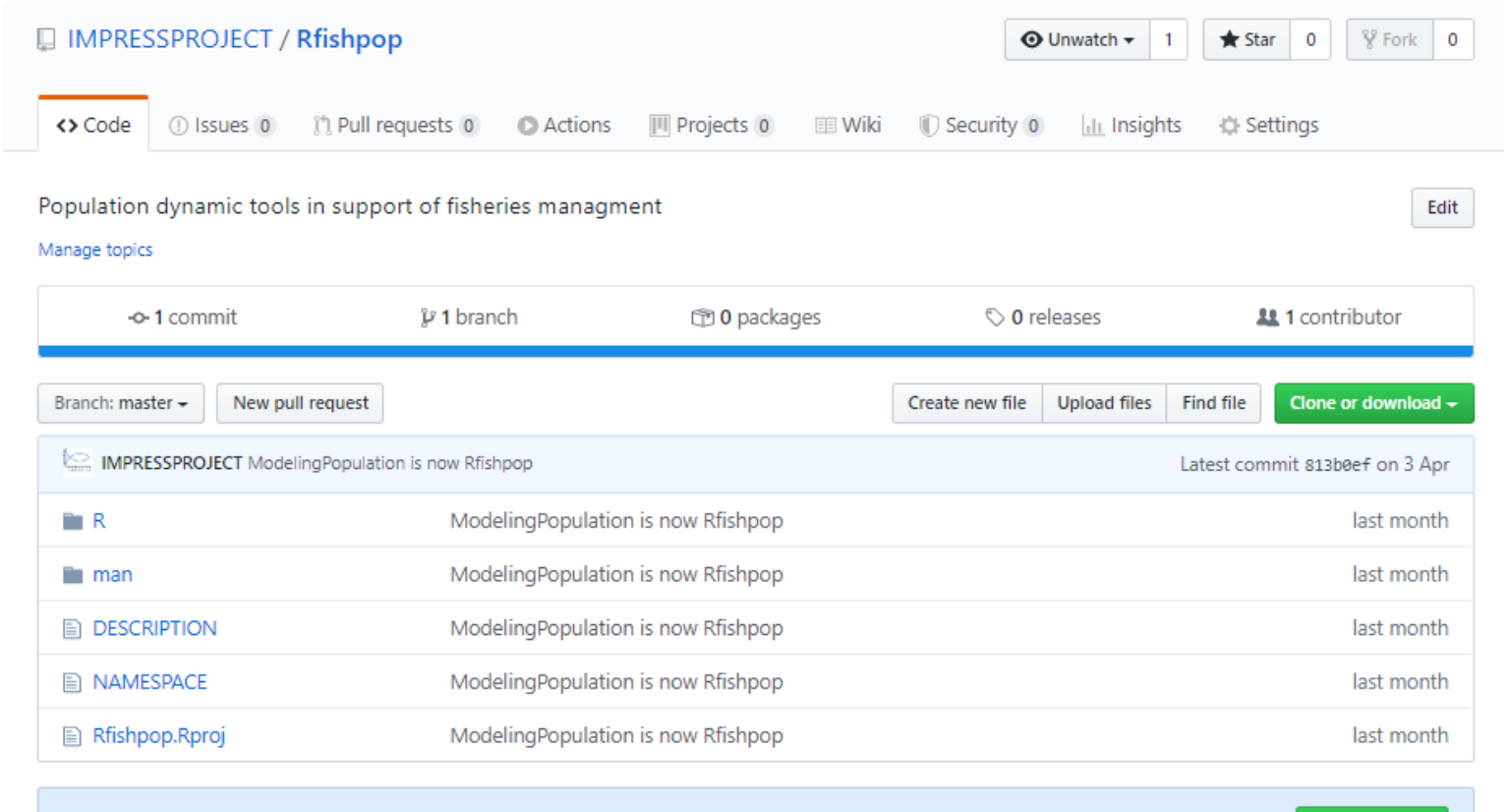
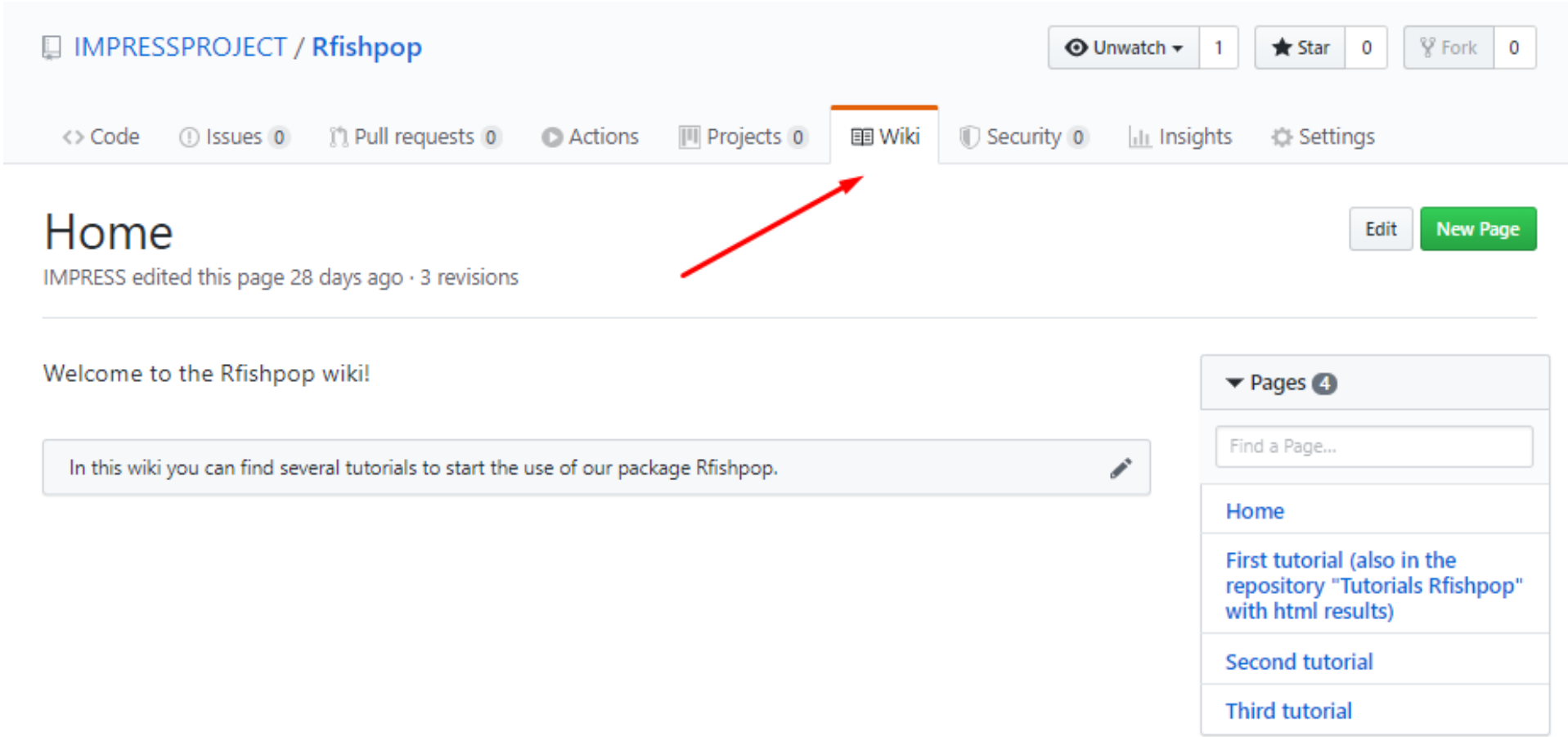
Rfishpop is an R package dealing with uncertainty for analyzing exploited populations.

Rfishpop is available on `https://github.com/IMPRESSPROJECT/Rfishpop`. Furthermore, tutorials describing the use of our package are also available.



Introduction



Generic age-structured operating model (OM)

The package includes tools to simulate the **real dynamics of a fishery system using a generic age-structured operating model (OM)**.

Population.Modeling {Rfishpop} R Documentation

Modeling an Exploited Population (Structured by Age)

Description

Provides a flexible and generic operating model (OM) which simulates the real dynamics of the fishery system. The OM is formed by biological, fishery and control components. The stock is described as age structured population along the time.

Usage

```
Population.Modeling(ctrPop, ctrBio, ctrFish, SR)
```

OM includes a biological system with recruitment, growth, maturity and mortality and a fishery system were fishing intensity and selection are modeled.

This system allows to implement structural uncertainty having different options for each process and natural stochasticity playing with variability in these processes.

Maximum Sustainable Yield (MSY) reference points

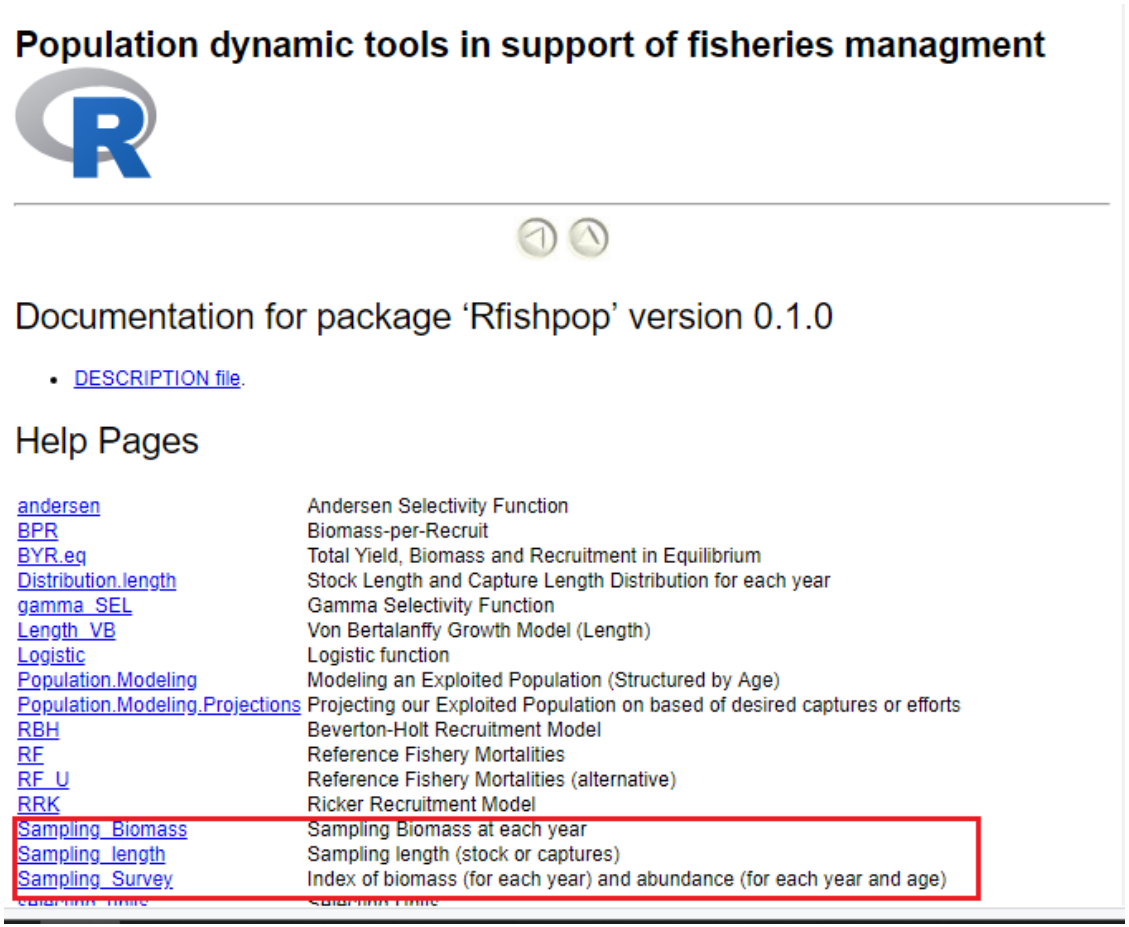
The package also contains a set of methods to estimate Maximum Sustainable Yield (MSY) reference points. These allow to identify management targets in terms of fishing intensity, population status and yield.

```
RF(Pop.Mod, 3,3,Method="mean",par=NULL,FM_type="F_msy",iters=1:2)
```

```
## , , 1
##
##              f         F       YPR       BPR        R        Y        B
## [1,] 0.3090528 0.2997637 0.2114027 0.5963804 9329.287 1972.237 5563.804
##
## , , 2
##
##             f        F       YPR       BPR        R        Y        B
## [1,] 0.398899 0.383811 0.2393533 0.5267986 9240.697 2211.792 4867.986
```

Statistical methods to simulate sampling error

The package also contains statistical methods to simulate sampling error, which is another source of uncertainty in fishery management, providing different data types which can suit different assessment methods, from simple data-limited methods to more complex age or length-structured methods.



Population dynamic tools in support of fisheries managment

Documentation for package 'Rfishpop' version 0.1.0

- DESCRIPTION file.

Help Pages

andersen	Andersen Selectivity Function
BPR	Biomass-per-Recruit
BYR.eq	Total Yield, Biomass and Recruitment in Equilibrium
Distribution.length	Stock Length and Capture Length Distribution for each year
gamma_SEL	Gamma Selectivity Function
Length_VB	Von Bertalanffy Growth Model (Length)
Logistic	Logistic function
Population.Modeling	Modeling an Exploited Population (Structured by Age)
Population.Modeling.Projections	Projecting our Exploited Population on based of desired captures or efforts
RBH	Beverton-Holt Recruitment Model
RF	Reference Fishery Mortalities
RF_U	Reference Fishery Mortalities (alternative)
RRK	Ricker Recruitment Model
Sampling_Biomass	Sampling Biomass at each year
Sampling_length	Sampling length (stock or captures)
Sampling_Survey	Index of biomass (for each year) and abundance (for each year and age)

Assessment models

The data obtaining from the sample functions are passed to the assessment model.

Our package does not implement any assessment models, the idea is to use available implementations of the assessment models.

The package contains specific functions to change the format of the data into the required format of the assessment model function. Now, the package contains such function for the data-poor method, LBI and LB-SPR. The list of functions will be expanded when exploring the application of other assessment models to the data reported by our package.

Data.to.LB.SPR(Pop.Mod,...)

Data.to.LBI(Pop.Mod,...)

Implementation of the HCR

Projecting our Exploited Population: This function allows us to extend our simulated Population through the years on based of the desired captures for such years or on based of the desired effort for such years.

Projecting our Exploited Population

Description

This function allows us to extend our simulated Population through the years on based of the desired captures for such years (strategy="catch") or on based of the desired effort f (component of fishing mortality F = f * SEL) for such years (strategy="effort") .

Usage

```
Population.Modeling.Projections(
  Pop.Mod,
  new.years,
  my.catch,
  tol,
  limit.f,
  strategy,
  my.effort
)
```

Concluding, the described functions of **Rfishpop package allow to verify the performance of management strategies or procedures in different settings generated from the OM.**

Concluding, the described functions of **Rfishpop package allow to verify the performance of management strategies or procedures in different settings generated from the OM.**

Thanks for your attention!

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