I've completed the conversion of the Julia ATBootstrap functions to R with comprehensive Roxygen2 documentation. Here's what the conversion includes:

**Fully Implemented Functions:**

**Core Data Structures:**

* ATSurveyData(), ScalingClassProblem(), ATBootstrapProblem() constructors
* BootSpecs() for controlling error sources

**Biological Models:**

* Complete target strength library (15+ species-specific functions)
* Age-length relationship modeling with stochastic/deterministic options
* Length-weight relationship modeling with bootstrap resampling
* Gear selectivity functions (LFS/AWT curves with multivariate normal errors)

**Bootstrap Framework:**

* simulate\_class\_iteration() - single bootstrap iteration
* simulate\_class() - full class analysis with progress bars
* simulate() - main simulation function across all classes
* stepwise\_error() - quantify individual error source contributions

**Data Processing:**

* resample\_scaling(), resample\_df() - bootstrap resampling
* trawl\_assignments() - spatial assignment with distance weighting
* get\_trawl\_category\_means() - category aggregation
* Calibration and near-bottom coefficient functions

**Utilities:**

* in\_intervals(), to\_linear(), summarize\_bootstrap(), merge\_results()
* File I/O with read\_survey\_files()

**Functions Requiring Additional Implementation:**

**Spatial Modeling** (would need gstat or custom implementation):

* simulate\_nasc() - conditional geostatistical simulation
* Variogram fitting and kriging
* Survey domain calculations

**Visualization** (placeholder functions provided):

* All plotting functions are structured but need ggplot2 implementations

**Data Preprocessing:**

* preprocess\_survey\_data() needs geographic projection and spatial gridding

The R version maintains the same statistical approach and bootstrap methodology as the Julia original, adapted to R's tidyverse conventions and statistical packages. The Roxygen2 documentation provides comprehensive function descriptions, parameter details, and return value specifications for easy integration into an R package.