Details about the spoked wheel dendrograms for the Fish and Fisheries manuscript

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1 Introduction

We are interested in determining the taxonomic bias of 1) fish species that are caught commercially and 2) those that undergo formal stock assessments. The accepted taxonomic coverage of fish species is provided by FishBase. The commercial catch data available from the Sea Around Us Project (SAUP) provides the reference for the taxonomic coverage of harvested species. The RAM Legacy database contains timeseries data for harvested species that undergo proper stock assessments.

Establishing the taxonomic biases of the catch and assessment data requires us to identify a common denominator between the three data sources. Large Marine Ecosystems (LMEs) provide a geographical zoning system that can be used to identify where different fish species occur in the world's oceans. However, LMEs were designed to identify shallow and coastal regions of the oceans and do not encompass open ocean regions. Highly migratory species that do not predominantly inhabit coastal habitats need to be treated separately.

Central to the RAM Legacy database is the concept of a population/stock. A stock links a species to an oceanic region under consideration for a stock assessment. A given fish species can have multiple stocks.

The RAM Legacy database and SAUP also contain non-fish species which should be removed from the comparison with FishBase. Similarly, species that are highly migratory should also be removed from the comparison.

A species list is generated for each of the three datasets. For each species in the list, the number of different LMEs that species appears is recorded.
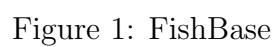
2   Taxonomic coverage

The FishBase taxonomic coverage can be found on Figure 2.

The SAUP taxonomic coverage can be found on Figure 2.

The srdb taxonomic coverage can be found on Figure 2.

3   Taxonomic bias

To examine the taxonomic bias of the SAUP data and that of the RAM Legacy database, the FishBase spoked wheel dendrogram is used as the accepted taxonomic coverage for fish species (top-left panel of Figure 3). The dendrogram is generated for the SAUP dataset while maintaining the Fish-Base branching pattern (top-right panel of Figure 3). The same is done to compare the RAM Legacy database to the SAUP dataset (bottom panel of Figure 3)
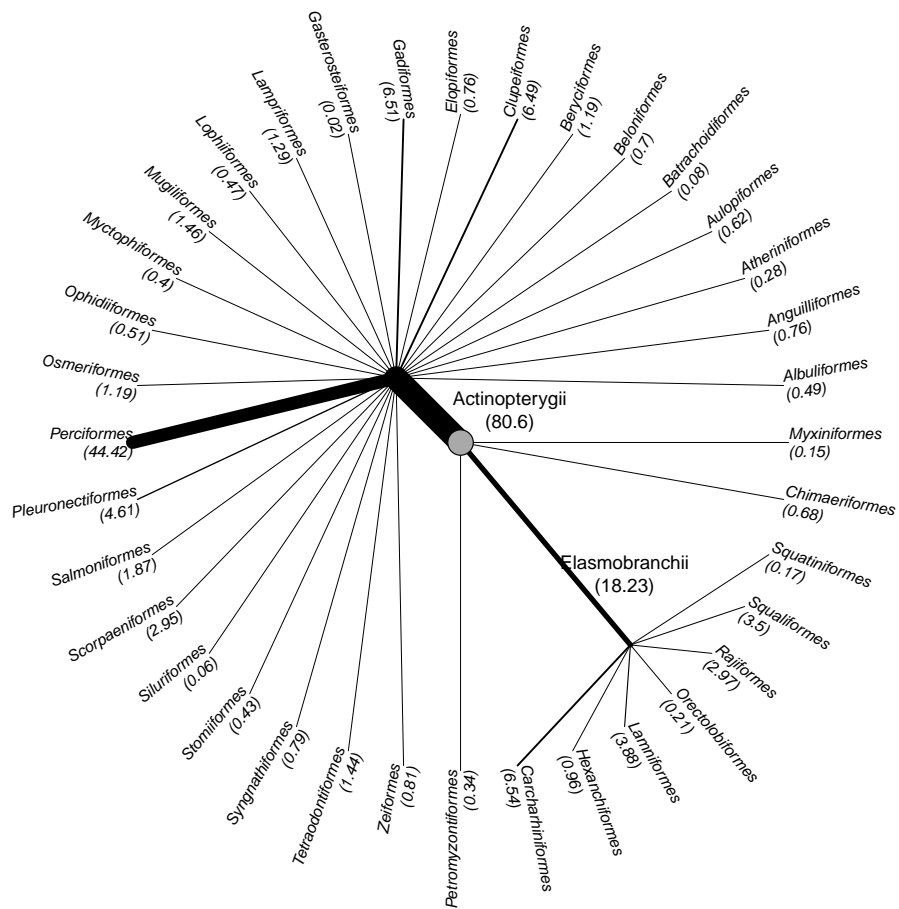
Figure 1: FishBase

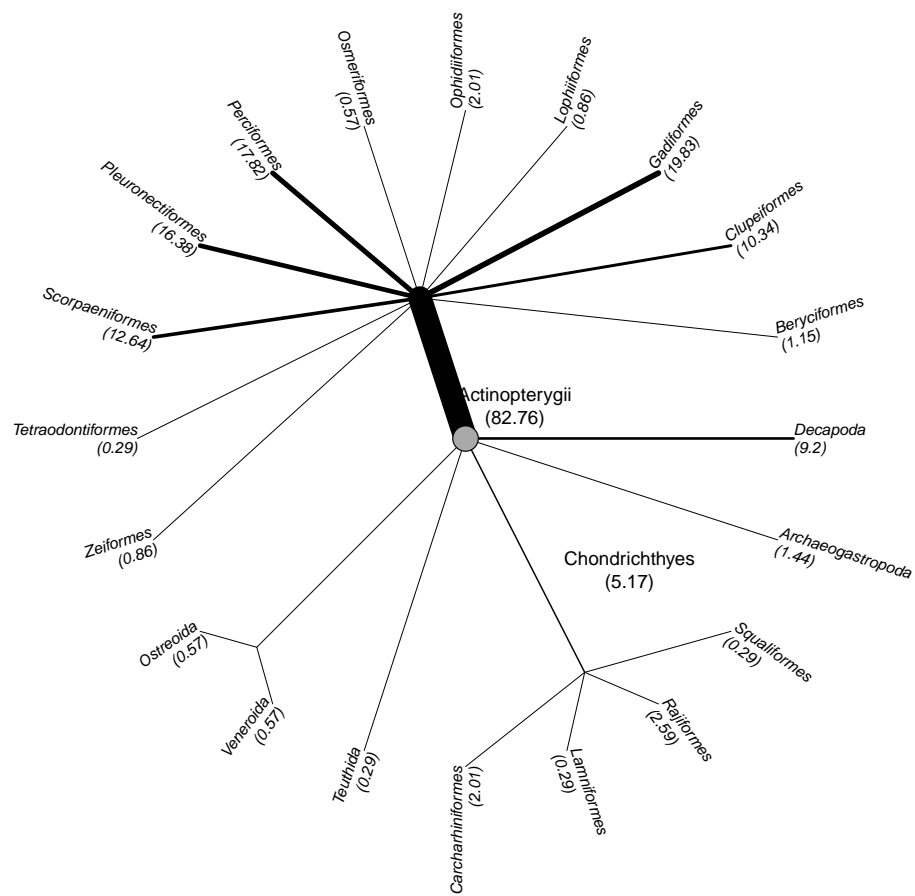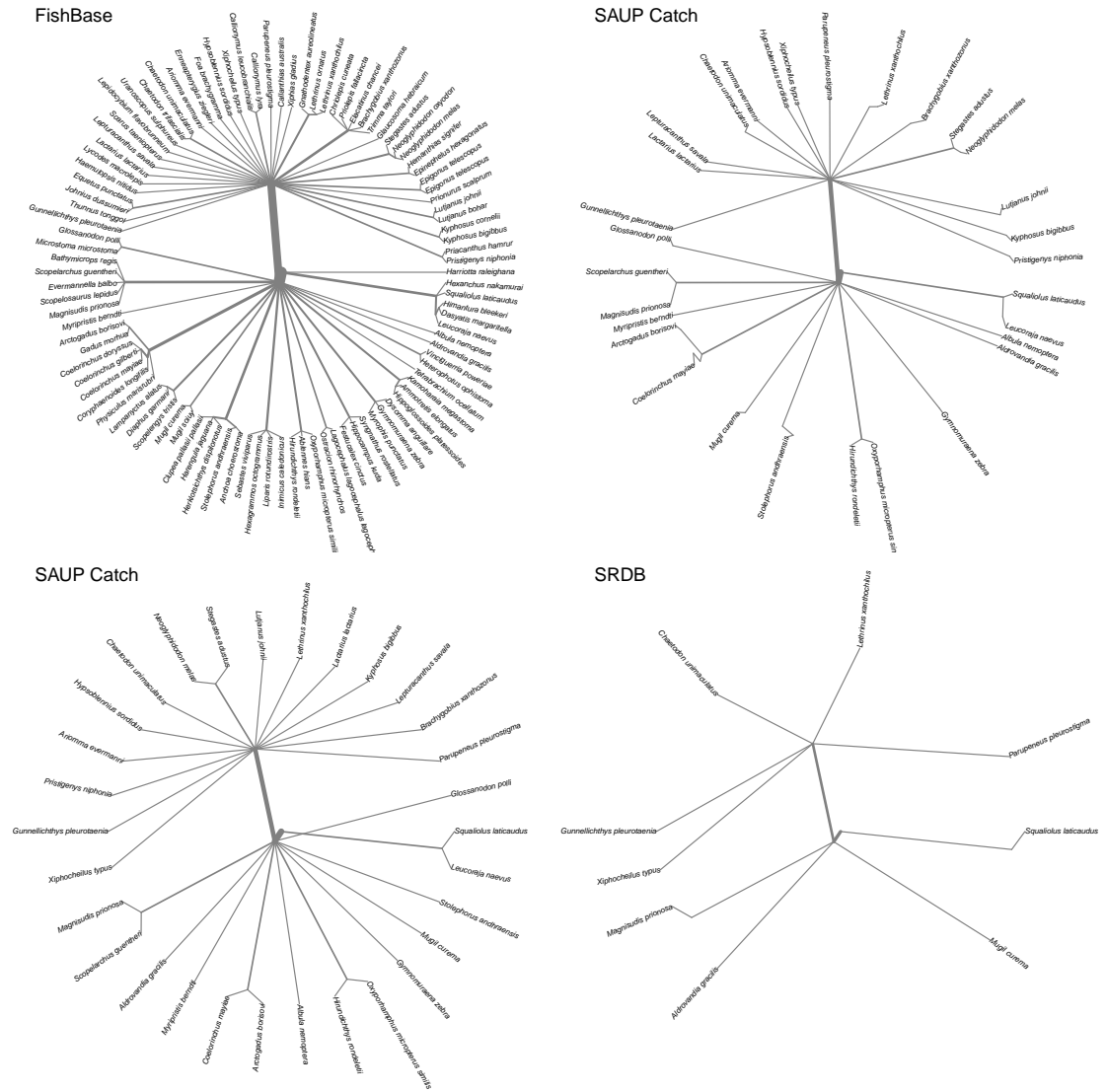Figure 2: SAUP - simulated as a sample from FishBase

Figure 3: srdb

Figure 4: SAUP compared to FishBase and srdb compared to SAUP