Department of
Primary Industries and
Regional Development
GOVERNMENT OF
WESTERN AUSTRALIA

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# Fish age structures

## The building blocks of healthy stocks

Age-based assessments provide an important tool for understanding fish populations and managing fisheries sustainably. Age data is helpful for understanding population structure, recruitment variability, and the overall health of the fish stock.

## Enlisting new recruits

Recruitment refers to the number of young fish spawned each year that survive their early life stages and grow into adults to join the breeding population.

Most marine fish are batch spawners and release many thousands of eggs each spawning season. These eggs hatch into larvae and drift in the water for days, weeks or months before settling into suitable habitats as juvenile fish. Even though fish can spawn thousands of eggs during a single spawning season, only a few survive these early life stages and grow to a size at which they are caught by fishers.

## Good years and bad years

The main factors affecting the number of young fish that survive the early life stages are environmental conditions such as temperature, food availability, predation and habitat suitability. For popular demersal scalefish species like snapper, a ‘good’ recruitment year may only occur once or twice a decade. Depending on the species’ biology and the current health of the stock, ‘pulses’ of strong recruitment into a population from prominent age classes may comprise a significant proportion of the stock.

## How are fish aged?

The age of bony fish can be determined by studying their ear bones, known as otoliths (Figure 1). Like the rings on a tree, otoliths have ‘growth rings’ which can be counted to tell a fish’s age. These ‘growth rings’ are laid down in the otolith over the course of a fish’s life, with each ring representing one year.

**Figure 1** An otolith section with growth rings

## Why age fish?

By ageing many individual fish in a resource, researchers can compile age profiles for our most valuable and important fish stocks. By monitoring changes in the age structure of populations over time, we can evaluate recruitment success and the effects of fishing mortality on stocks.

## Age structures – a snapshot of our stocks

The age structure of a fish population refers to the distribution of fish from different age classes. A healthy population age structure has fish of all ages, from recently hatched to the oldest individuals.

Age structures sampled from the catches of fishers typically lack young fish, which have not yet grown to a size at which they are captured by fishing gear. Additionally, as fishing can selectively remove larger, older fish in a population, this can lead to age structures lacking old fish.

Large and old fish are important contributors to the reproductive capacity of a population.

Large female fish produce much larger numbers of eggs than smaller fish. A population dominated by younger fish has a reduced reproductive potential, and hence a limited capacity to replenish the population.

Case Study

## WA dhufish in the West Coast bioregion

Figure 2 shows that the age structure of WA dhufish is dominated by young fish (less than 15 years old), despite a maximum age of 41 years.

The lack of older fish indicates the population has relatively few older breeding fish that are critical for replenishing the population.

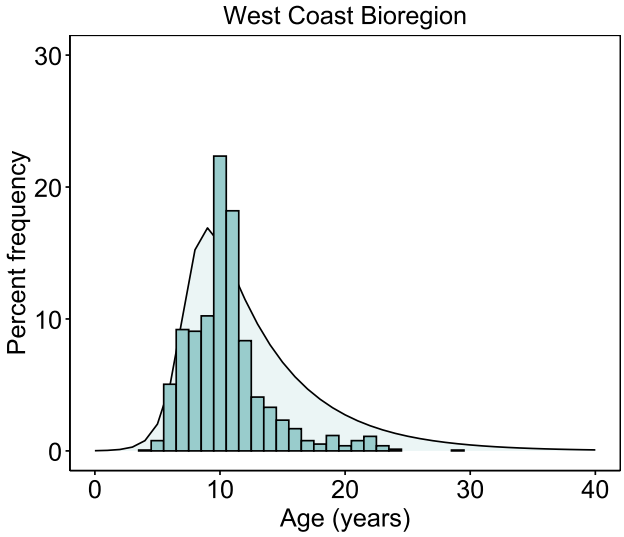


**Figure 2** The 2021-22 age structure of WA dhufish (green bars) compared to a healthy population (shaded area)